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Research Article

The grasshoppers and crickets (Orthoptera) of the Socotra Archipelago (Yemen): a comprehensive overview and a description of a new *Oecanthus* Tree Cricket (Oecanthidae)

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Abstract

This paper presents all available information on the Orthoptera of the Socotra Archipelago, an area well-known for its endemic flora and fauna. General information is provided about the climate and geology of the Socotra Archipelago. The various habitats where grasshoppers have been found are described and illustrated, followed by a concise history of Orthoptera research on Socotra. Besides an identification key to the species, additional information about the material examined, taxonomy, diagnostic notes, distribution and occurrence, including maps, habitat, biology and bioacoustics, is provided for each species. In total, 65 Orthoptera species are reported here from Socotra, Abd el Kuri, Samha and Darsa, including *Oecanthus castaneus* Felix & Bouwman, **sp. nov.** and two unknown species assigned to *Ectatoderus*. Of these 65 species, 30 (46%) are endemic to the Socotra Archipelago. Re-descriptive notes on *Acrotylus innotatus* Uvarov, 1933 and *Glomeremus capitatus* Uvarov, 1957 are provided, including the description of the female of the latter species and the male of *Oxytruxalis ensis* (Burr, 1899). *Acrotylus innotatus* Uvarov, 1933, *Dictyophorus griseus* (Reiche & Fairmaire, 1850), *Eumodicogryllus chivensis* (Tarbinsky, 1930), *Ochrilidia geniculata* (Bolívar, 1913), *Sphingonotus rubescens* (Walker, 1870) and *S. balteatus* (Serville, 1838) are recorded for the first time from the Archipelago. Bioacoustics are presented for: *Ochrilidia socotrae* Massa, 2009, *Stenohippus socotranus* (Popov, 1957), *Sphingonotus ganglbaueri* Krauss, 1907, *S. insularis* (Popov, 1957), *Acheta rufopictus* Uvarov, 1957, *Eumodicogryllus chivensis* (Tarbinsky, 1930), *Ectatoderus guichardi* Gorochov, 1993 as well as two other species assigned to *Ectatoderus*, *Oecanthus castaneus* Felix & Bouwman, **sp. nov.**, *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906) and *Pachysmopoda abbreviata* (Taschenberg, 1883). Red List Assessments for 29 endemic species have been prepared including *Oxytruxalis ensis* (Burr, 1899) (Critically Endangered, CR), *Cataloipus brunneri* (Kirby, 1910) (Endangered, EN) and *Glomeremus capitatus* Uvarov, 1957, *Phaneroptila insularis* Uvarov, 1957, *Phaulotypus granti* Burr, 1899, *Socotracris kleukersi* Felix & Desutter-Grandcolas, 2012, *Socotrella monstrosa* Popov, 1957 and *Xenephias socotranus* Kevan, 1973 (all Vulnerable, VU).

Key Words

Bioacoustics, checklist, endemism, Indian Ocean, island, new species, Red List, taxonomy

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Introduction

The Socotra Archipelago is an area well-known for its endemic flora and fauna. The grasshoppers and crickets (Orthoptera) have been studied extensively by Uvarov and Popov (1957), taking into account all the previous literature. Subsequently, Kevan (1973), Popov (1981, 1984, 1997), Gorochov (1993), Wranik (2003), Massa (2009, 2017) and Desutter-Grandcolas and Felix (2012) added information about the Orthoptera fauna of Socotra. Apart from Uvarov and Popov (1957) and Wranik (2003), no comprehensive overview of the Socotran Orthoptera fauna has been published. The current paper is a comprehensive overview of all information available on the Orthoptera of the Socotra Archipelago.

The paper is based on two collecting trips to the main island in February/March 2009 and October/November 2010 by RF, JBo and RK. In addition to the dataset resulting from these two trips, which has more than 400 records, some 350 additional field observations have been added, as well as data from collection specimens from diverse institutions, information from relevant literature and observation records from online platforms of iNaturalist and Observation.org. The current paper encompasses more than 2000 Orthoptera records from 1896 to 2024.

The Socotra Archipelago

Topography

The Socotra Archipelago is located in the Gulf of Aden, in the north-western part of the Indian Ocean and belongs administratively to Yemen (Fig. 1). The Archipelago consists of four islands and two small rocky islets. Socotra, the main island, lies 230 km from Somalia and 380 km from the Arabian Peninsula. It measures 135 km from west to east, 42 km from north to south at its widest point and has a surface area of 3625 km^2. Abd el Kuri lies closer to Somalia than to the main island and measures 133 km^2. Samha (41 km^2) and Darsa (10 km^2) are small islands in between Abd el Kuri and Socotra, known as "The Brothers".

Endemism

Socotra is an ancient continental island of Gondwana origin. The timing of Socotra's separation from the African mainland is still a matter of debate and is estimated to lie between 165 Mya and 15 Mya. An important biogeographical consideration is the assumption that the Hagher Mountains (also spelt Haggier or Hajhir) have been above sea level since the end of the Cretaceous and must, therefore, be considered one of the most isolated landmasses on Earth (Brown and Mies 2012).

Consequently, Socotra is well known for its high degree of endemism in flora and fauna. Socotra is amongst the five world insular systems richest in endemic species: fifteen plant genera, 308 (37%) of the 835 plant species, 90% of reptiles, 95% of land molluscs and 73% of isopods are endemic (Van Damme and Banfield 2011). The total number of endemic insect taxa described from the Archipelago is 662 species, representing 42% of all known insect species on the islands (Bezděk and Hájek 2017). According to Purchart et al. (2020), 80.3% of tenebrionid beetles and 51.5% of spiders are endemic to the Socotra Archipelago, while 18.5% of butterflies and only one species of dragonfly is endemic (Van Damme et al. 2020). Socotra was designated

a Biosphere Reserve in 2003 and a UNESCO World Heritage Site in 2008 (Van Damme and Banfield 2011).

Geology

Socotra can be divided into three main regions. The granitic Hagher Mountains, consisting of Precambrian basement rock, dominate the centre of the island's eastern half, with their prominent peaks, sheer cliffs, deep gorges and wadis. It is the only part of Socotra where the altitude exceeds 1,000 m a.s.l. The highest peak is Mount Scand at 1,530 m a.s.l. The Hagher penetrate through vast Cretaceous and Tertiary limestone plateaus occupying by far the most significant part of the island, rising to an average elevation of 300–700 m a.s.l. Well-known areas include Dixam and Momi, where vast, undulating expanses of bare limestone form the landscape. Where plateaus do not directly reach the seashore, coastal plains comprise the rest of the island. They are covered by Pleistocene and Holocene sands and gravel, like Noged in the south and Hadiboh Plain in the north (Fig. 1) (Kossmat 1907; Popov 1957; Brown and Mies 2012). Like Socotra, Abd el Kuri is made of a granite core primarily covered by limestone. It lacks a vast mountain range like the Hagher, with the highest peak being Mount Saleh at 570 m a.s.l. Basement rocks penetrate the limestone in some lower hilly areas. Darsa and Samha are flat-topped limestone plateaus (Kossmat 1907; Brown and Mies 2012).

Climate

The climate on Socotra is highly influenced by the summer and winter monsoons, separated by autumn and spring transition periods (Scholte and De Geest 2010). Hence, Socotra experiences four distinct seasons (Table 1). In the lowlands, the temperature is comparable to that of the surrounding Arabian and African continents, with mean annual temperatures approaching 30 °C. High into the Hagher Mountains, temperatures can drop below 10 °C at night in winter. The mean annual rainfall on lower to mid-elevations is around 200 mm. The south-facing

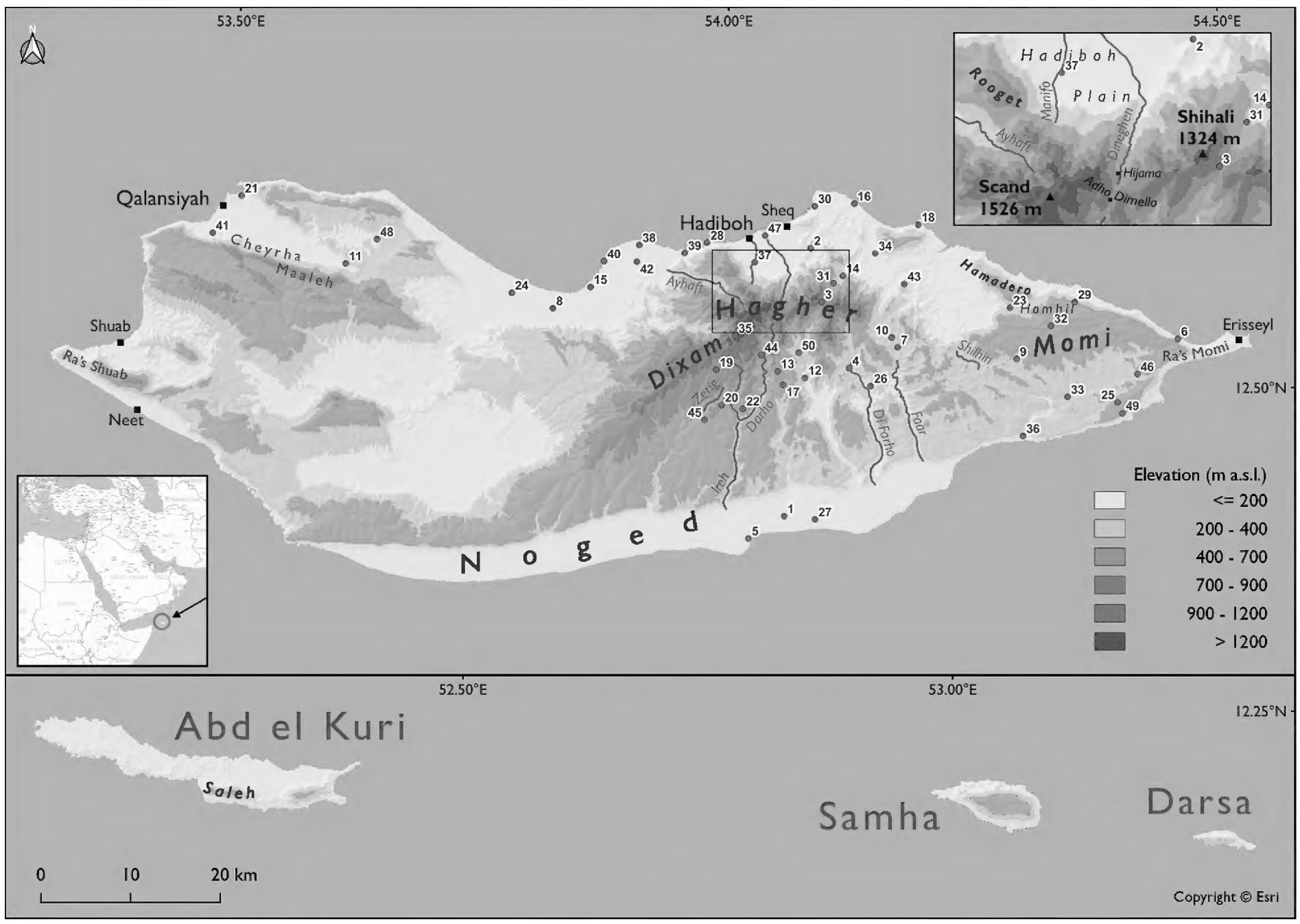

Figure 1. The Socotra Archipelago (Yemen) with toponyms. 1. Abataro (settlement); 2. Adah (wadi); 3. Aduno (pass); 4. Aloove (settlement); 5. Amak (settlement); 6. Arher (spring); 7. Ba'a (settlement); 8. Balqathan (plain); 9. Begobig (settlement); 10. Betin (settlement); 11. Bi'r Haarso (waterhole); 12. Bijo (settlement); 13. Bojhin; 14. Dahamis (basecamp); 15. Dehamd (lagoon); 16. Delisha (settlement); 17. Di Asmo (settlement); 18. Di Hamri (cape and settlement); 19. Di Hashus (settlement); 20. Dirhor (settlement); 21. Ditwah (lagoon); 22. Firmihin (protected area); 23. Goahar (valley); 24. Gubba (lagoon); 25. Gudhm; 26. Haasan (settlement); 27. Halmi (settlement); 28. Heybaq (cape); 29. Hoq (cave); 30. Hulaf (settlement); 31. Jena-agahan; 32. Kazazahn (small area); 33. Kilisan (wadi); 34. Maabad (plain); 35. Madar (wadi); 36. Matyaf (lagoon); 37. Mokasu (wadi); 38. Mori (settlement); 39. Qadub (settlement); 40. Qarmah (cape); 41. Qeysoh (spring); 42. R.A.F. Camp (military basecamp); 43. Rookeb (hill); 44. Saqal; 45. Shibhon (settlement); 46. Sink; 47. Sirhin; 48. Taaqs (plain); 49. Zeflh; 50. Zemhom (area).

Table 1. Seasons and weather circumstances on Socotra (derived from Scholte and De Geest (2010)).

Spring	Summer Monsoon			Autumn	Winter Monsoon
Mid-Feb – mid-Apr	**Mid Apr–Jun**	**Jul–mid Aug**	**Aug–Sep**	**Oct**	**Nov – Feb**
Wind from NE towards SW.	Increasing wind speed from SW			Wind from SW towards NE	Winds from NE
Dry, hot, rather cloudless	Rain influences the southern regions of the island and only sporadically reaches the northern regions.	Dry. Harsh winds create cloud cover above the southern coastal and especially at higher altitude plateaus.	High humidity	Relative humidity decreases and temperatures rise towards the end of the period when the first rains may fall.	Highest annual rainfall in Nov, affecting the entire island

slopes of the Hagher and the higher plateaus are influenced by moisture from the SW monsoon in the form of drizzle or fog (Scholte and De Geest 2010).

Habitats

Elevational differences, exposure, precipitation (rain, fog and dew) and soil type give rise to very diverse habitats on Socotra, spanning from arid deserts to evergreen forests within a restricted geographical area (Batelka 2012). Habitats can be assigned to one of five altitudinal zones: coastal: 0–200 m a.s.l.; low elevation: 200–400 m a.s.l.; medium elevation: 400–700 m a.s.l.; montane 700–1200 m a.s.l. and high montane 1200–1540 m a.s.l. Brown and Mies (2012) describe the major plant communities linked to these altitudinal zones. Here, we present a selection of vegetation types mentioned by Brown and Mies (2012), representing the most important habitats for Orthoptera. The accompanying photos illustrate the island's diverse landscapes. See also Uvarov and Popov (1957) for a description of orthopteran habitats.

Salt marsh

Patches with salt-tolerant (semi-)succulent plant species locally occur along the coast (Fig. 2). Vegetation cover is very high and dominated by medium-high perennial species like *Arthrocnemum macrostachyum*, *Aerva javanica* and *Limonium sokotranum*. The substrate is regularly flooded (Brown and Mies 2012).

The number of Orthoptera species in salt marsh is relatively low, but a characteristic species of this vegetation is *Heteracris adspersa* (Redtenbacher, 1889). On Socotra, it is confined to this community. The only record of *Eumodicogryllus chivensis* (Tarbinsky, 1930) comes from this habitat. The widespread species *Pyrgomorpha tereticornis* (Brullé, 1840) also occurs here.

Beaches and dunes

Sandy coralline beaches are very common on Socotra. Locally undulating sand sheets and higher dune complexes have developed further away from the shore, like on Noged Plain (Brown and Mies 2012). *Ochrilidia socotrae* Massa, 2009 is strictly associated with the tussock grass *Urochondra setulosa* in sand sheets and fringes of coastal dunes (Figs 2, 3). A widespread and common species, like *Acrotylus incarnatus* Krauss, 1907, can be found in good numbers in dunes and on sandy beaches. *Sphingonotus ganglbaueri* Krauss, 1907 occurs near the shoreline and prefers coarser substrates like coralline gravel.

Coastal plains

Where inland mountains and limestone plateaus reach the sea, coastal plains at elevations of 0–200 m a.s.l. dominate the landscape, varying from gently sloping landscapes to flat plains of various substrates; sandy patches are intertwined with coarse gravel and small rocks. The most common vegetation here is the *Croton socotranus* community (Fig. 4). Various grasses and perennial herbs

Figure 2. Salt marsh with *Arthrocnemum macrostachyum* and *Aerva javanica*. The salt marsh, separated by a coastal dune with *Urochondra setulosa*, is the typical habitat of *Heteracris adspersa*. Neet, Socotra, 28 Oct 2010 (photograph Rob Felix).

Figure 3. Coastal coralline sand sheet with the grass *Urochondra setulosa*. Habitat of *Ochrilidia socotrae* and *Acrotylus incarnatus*; on patches with coarser coralline gravel, *Sphingonotus ganglbaueri* occurs. Erisseyl, Socotra, 3 Nov 2010 (photograph Rob Felix).

Figure 4. Typical coastal plain vegetation, dominated by *Croton socotranus*. Grassy patches are the typical habitat of *Stenohippus socotranus*. Taaqs, east of Qalansiyah, Socotra, 28 Feb 2009 (photograph Robert Ketelaar).

Figure 5. Coastal plain at Hulaf with *Acacia edgeworthii*. Geophilous species like *Acorypha glaucopsis* and *Acrotylus incarnatus* occur in good numbers. The phytophilous *Diabolocatantops axillaris* is a common species in this habitat (photograph Robert Ketelaar).

develop with the onset of the first rains (Brown and Mies 2012). The most extensive plain is Noged in the south, approximately 60 kilometres long and a maximum of 5 kilometres broad. Other examples are Hadiboh Plain and Hulaf in the north (Fig. 5).

On the coastal plains, a wide variety of grasshoppers and crickets occurs. Many geophilous species favour this habitat: *Acrotylus incarnatus*, *Sphingonotus insularis* (Popov, 1957), and *Stenohippus socotranus* (Popov, 1957) are most common here. Phytophilous species such as *Pyrgomorpha tereticornis*, *Diabolocatantops axillaris* (Thunberg, 1815) and *Anacridium melanorhodon arabafrum* Dirsh & Uvarov, 1953 occur in vegetated parts. *Glomeremus pileatus* (Krauss, 1902) and *Pachysmopoda abbreviata* (Taschenberg, 1883) can also be found here, hiding under stones during the daytime.

Littoral margins

Rushes, sedges and grasses occur along streams, pools and springs at all elevations and form the habitat of moist-loving Orthoptera species. On the limestone plateaus, *Juncus* can form dense stands (Fig. 6). Here, several moist-loving Orthoptera species occur, such as *Aiolopus thalassinus* (Fabricius, 1781), *Paratettix subpustulatus* (Walker, 1871), *Trigonidium cicindeloides* Rambur, 1838, *Gryllotalpa* aff. *G. africana* Palisot de Beauvois, 1820 and *Conocephalus maculatus* (Le Guillou, 1884). Many sites like this are overgrazed by cattle, resulting in permanently low vegetation, with *Plantago* and *Eleocharis*, amongst others, where *Paratettix subpustulatus* can be numerous (Fig. 7).

Figure 6. A dense stand of *Juncus* along a pool. Habitat of *Aiolopus thalassinus*, *Paratettix subpustulatus*, *Trigonidium cicindeloides* and *Gryllotalpa* aff. *G. africana*. It is also the habitat the long-lost *Cataloipus brunneri*. Zerig, Socotra, 27 Feb 2009 (photograph Rob Felix).

Figure 7. Moist soil on a bank of a stream in the Hagher with *Plantago amplexicaulis* and *Eleocharis*. Prime habitat of *Paratettix subpustulatus*. Ayhaft, Socotra, 22 Feb 2009 (photograph Rob Felix).

Lower-altitude rocky slopes

At lower-elevation rocky slopes (200–400 m a.s.l.), *Adenium*- or *Jatropha*-dominated shrubland has developed (Fig. 8). Vegetation cover and species composition vary depending on grazing pressure (Brown and Mies 2012). Characteristic grasshopper species here are *Oedaleus senegalensis* (Krauss, 1877), *Sphingonotus insularis* and *Scintharista forbesii* (Burr, 1899), all occurring on the ground. At the same time, the phytophilous *Phaneroptera sparsa* Stål, 1857, *Phaulotypus insularis* (Burr, 1899), *P. socotranus* (Popov, 1957), *Oecanthus castaneus* Felix & Bouwman, sp. nov. and *Dioscoridus depressus* Popov, 1957 can be found inside or near shrubs and small trees.

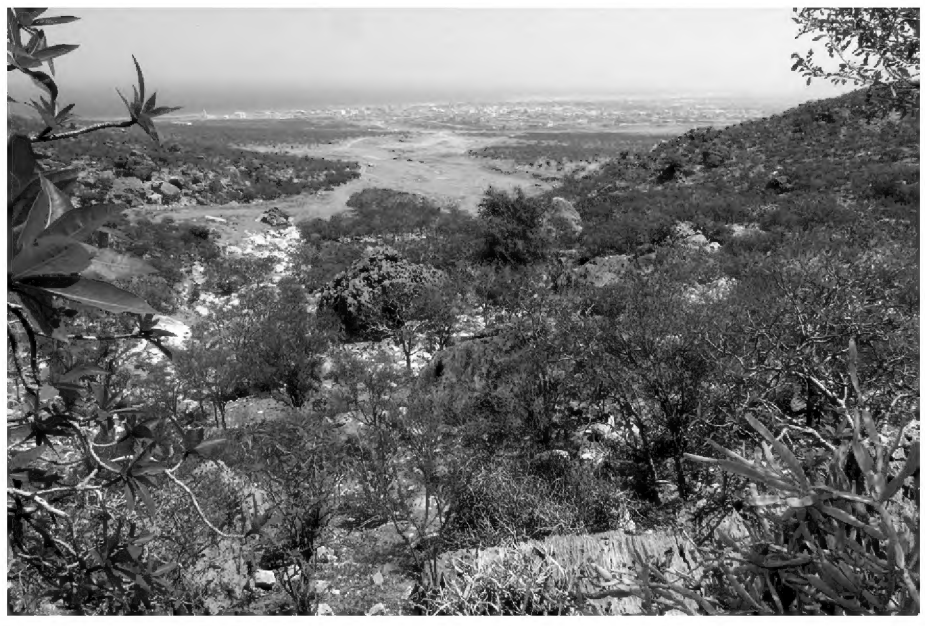

Figure 8. Rocky slopes below 400 m a.s.l. with *Jatropha unicostata*. Geophilous as well as phytophilous species occur here: *Oedaleus senegalensis*, *Sphingonotus insularis*, *Scintharista forbesii*, *Phaneroptera sparsa*, *Phaulotypus insularis*, *P. socotranus* and *Oecanthus castaneus* Felix & Bouwman, sp. nov. Foothills south of Hadiboh, Socotra, 5 Mar 2009 (photograph Rob Felix).

Figure 9. Dixam is a well-known limestone plateau on Socotra. Limestone plateaus comprise large parts of Socotra; vegetation is often scarce. It is the habitat of *Acorypha bimaculata*, *Acrotylus innotatus*, *Scintharista forbesii* and *Sphingonotus insularis*. Dixam Plateau, Socotra, 5 Nov 2010 (photograph Rob Felix).

Mid-elevation shrubland

Large parts of Socotra are covered by limestone plateaus with an elevation of 400–700 m a.s.l. The substrate is primarily bare rock with a varying degree of vegetation. Most often, vegetation is rather scarce; on Dixam Plateau, *Dracaena* trees are a distinctive feature (Brown and Mies 2012) (Fig. 9). Many geophilous grasshoppers have their prime habitat here: *Acorypha bimaculata* (Krauss, 1902), *Scintharista forbesii*, *Sphingonotus insularis*, *Acrotylus innotatus* Uvarov, 1933 and the ever-present *Acrotylus incarnatus* are common. *Scintharista* prefers larger bare rock surfaces and giant boulders. The other species are present on finer substrates.

Caves

The limestone plateaus of Socotra are interspersed with extensive karst formations, including numerous caves (Fig. 10). So far, one troglobitic cricket species has been described from Socotra, *Socotracris kleukersi*, Felix & Desutter-Grandcolas, 2012, occurring in a cave on Dixam Plateau.

Figure 10. Hoq Cave, Momi. *Socotracris kleukersi* Felix & Desutter-Grandcolas, 2012 inhabits karst formations in Dixam. Troglobitic crickets are not yet known from Momi Plateau with this and other caves (photograph Rob Felix).

Figure 11. Woodland and dense thickets on the flanks of the Hagher. With increasing elevation and moisture availability, these are habitats of *Phaneroptila insularis* and, presumably, *Oxytruxalis ensis*. Depicted is the site named Hijama in Uvarov and Popov (1957) or Kishen by the Oxford Expedition (1956) and Guichard (1967). Wadi Dineghen, Socotra, 30 Oct 2010 (photograph Rob Felix).

Lower montane woodland

In areas of increased moisture availability, particularly on north-facing slopes, in ravines and shaded valleys at elevations above 500 m a.s.l., conditions are favourable for denser vegetation, resulting in the presence of woodland. Trees are prominent and thickets can be very dense and species-rich. Good examples are the northern slopes of the Hagher (Fig. 11) and the higher parts of Wadi Ayhaft and Moukaradia Pass (Brown and Mies 2012).

Characteristic Orthoptera of thickets and shrubs at this elevation and higher are *Phaneroptila insularis* Uvarov, 1957, *Oecanthus chopardi* Uvarov, 1957, *Pachysmopoda abbreviata* (Taschenberg, 1883), *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906) and *Socotrella monstrosa* Popov, 1957. On open patches with grassy vegetation and perennial herbs, *Ermia variabilis* Popov, 1957, *Glomeremus capitatus* Uvarov, 1957 and possibly *Oxytruxalis ensis* (Burr, 1899) occur.

Figure 12. Shrub communities dominated by *Hypericum* and *Helichrysum* around 1,000 m a.s.l. Habitat of *Phaulotypus granti* and *Xenephias socotranus*. Adho Dimello, Socotra, 1 Nov 2010 (photograph Rob Felix).

Montane cloud zone

At higher elevations in the Hagher, above 700 m a.s.l., mean temperatures are lower, dropping sharply during the late afternoon and night, while dewfall and fog add to the moist conditions. With rising elevation, the number of goats decreases rapidly and cows are more prevalent. Dense shrubs and woodlands have developed here, with *Searsia thyrsiflora*, *Cephalocroton socotranus* and *Hypericum scopulorum* being common species (Brown and Mies 2012). *Phaulotypus granti* Burr, 1899 is associated with the latter species. High-altitude shrubs are the habitat of *Phaneroptila insularis*, *Oecanthus chopardi*, *Pachysmopoda abbreviata*, *Ruspolia* aff. *R. basiguttata*, *Socotrella monstrosa* and *Xenephias socotranus* Kevan, 1973. Due to grazing and erosion, the shrubs are interspaced with small open areas of herbs and grasses. Here, *Ermia variabilis* occurs in good numbers. Some parts of the montane shrubland have been altered to montane pastures, especially in gently sloping areas with seeping water; this is the habitat of *Modicogryllus perplexus* Otte & Cade, 1984.

High-montane granite peaks

The highest parts of the Hagher, above 1200 m a.s.l., are covered by a unique evergreen woodland with thickets composed of many endemic plant species. The tree layer is relatively open, while the shrub layer is very dense, dominated by *Hypericum* and *Helichrysum* (Brown and Mies 2012). The Orthoptera of the highest regions of the Hagher is a continuation of the montane and high-montane cloud zone, with the following species recorded here: *Glomeremus capitatus*, *Dioscoridus depressus*, *Phaulotypus granti*, *Socotrella monstrosa* and *Xenephias socotranus*.

History of Orthoptera research on Socotra

A complete overview of the history of biological exploration of the Socotra Archipelago is presented by Wranik (2003) and Bezděk and Hájek (2017). Here, we mention the orthopterological aspects of these historical expeditions and collecting voyages.

The biological exploration of Socotra began in 1834 when Lieutenant James Raymond Wellsted landed on Socotra with two colleagues for a two-month stay. He made notes on the flora and fauna of the island in his Memoir on the Island of Socotra (Wellsted 1835). He was the first to mention Orthoptera and the absence of one specific member: "locusts have been rarely seen in Socotra".

Isaac Bayley Balfour and his team from London made the first detailed biological survey of the island in 1880. They collected mainly plants and some birds, lizards and insects, amongst which some specimens of *Acorypha glaucopsis* (Walker, 1870), as mentioned by Popov (in Uvarov and Popov (1957)).

Emil Riebeck from Halle, Germany, who visited the island in April and May 1881 (Neumann and Gedeon 2009), collected several of Socotra's orthopterans. Taschenberg (1883) published Riebeck's results, presented ten specimens of four species and described the peculiar *Pachysmopoda abbreviata* as new to science. Riebeck's specimens are deposited in the Martin Luther Universität collection in Halle-Wittenberg, Germany.

Ernest Bennett, who visited the island from December 1896 till February 1897 with the explorers couple Theodore and Mabel Bent, made a small collection of orthopterans. Bennett collected six specimens belonging to five species, presented by Burr (1898), who described *Physemophorus sokotranus* Burr, 1898. Bennet's specimens are deposited in the Oxford University Museum of Natural History, Oxford (OUMNH).

The first genuine zoological expedition, which resulted in a good collection of grasshoppers and crickets, was carried out by Henry Ogg Forbes from the Liverpool Museum and William Robert Ogilvie-Grant from the British Museum (Fig. 13). They reached the Archipelago in December 1898 and stayed for three months, also visiting Abd el Kuri at the beginning of December 1898 and at the end of February 1899. Forbes (1903) published the itinerary of this expedition.

Burr (1899b) presented the first orthopterological results of this expedition and described two new genera and six new species; in 1903, he published the comprehensive results (Burr 1903). The collection made by Forbes and Ogilvie-Grant, consisting of around twenty species and fifty specimens, is divided amongst three depositories: the Natural History Museum in London (NHMUK), the World Museum in Liverpool (WML) and OUMNH.

In more or less the same period, January–March 1899, another important zoological expedition went to Socotra, organised by the Imperial Academy of Sciences in Vienna, Austria. One of the members was entomologist Oskar Simony. He and his team visited Abd el Kuri and Samha in the second half of January 1899. He collected forty specimens of fourteen species (Fig. 14). The collection is deposited in the Natural History Museum, Vienna.

Krauss (1902) published the results of the Austrian expedition and described six species new to science. Rebel (1907) published an itinerary of the Austrian expedition.

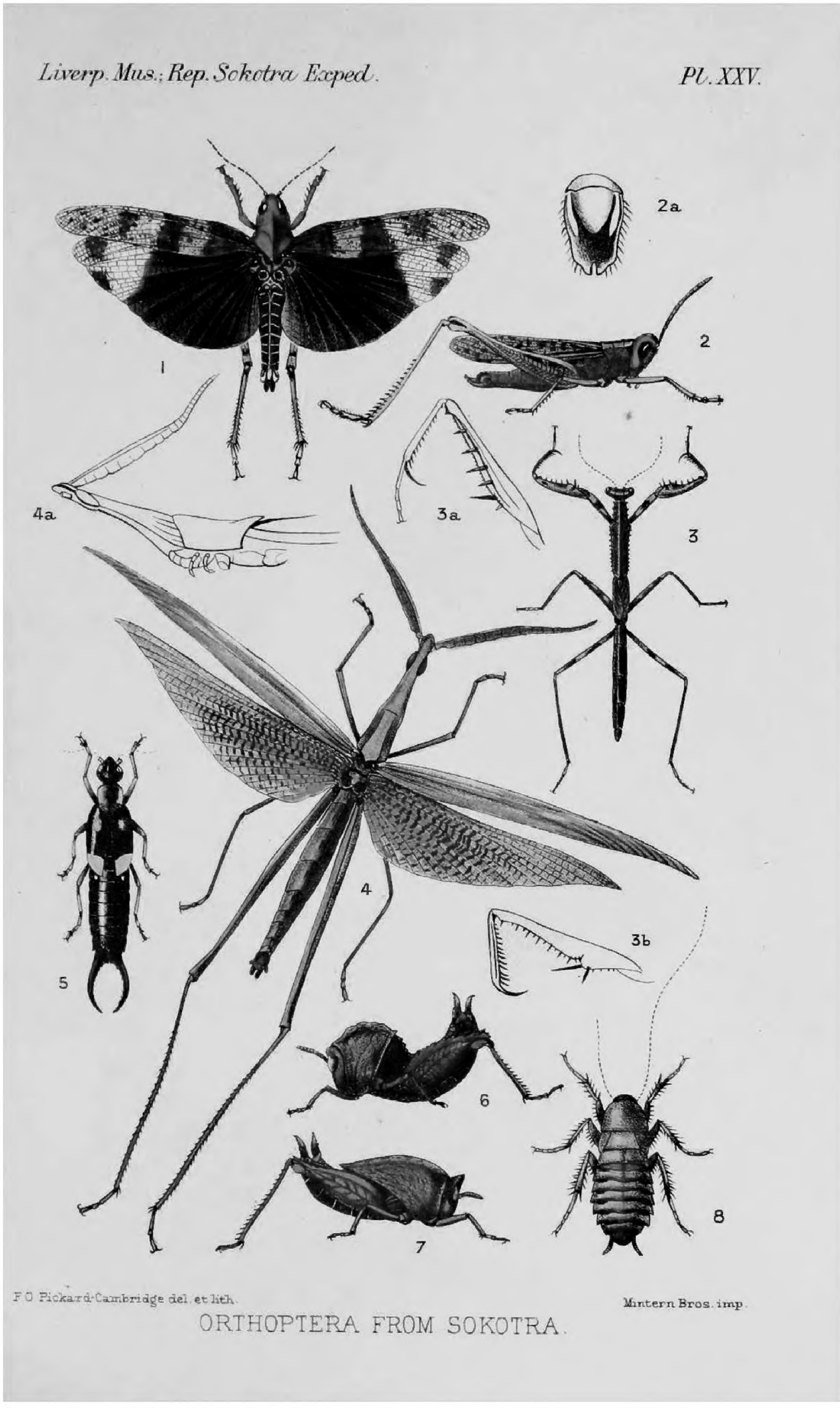

Figure 13. Plate from Forbes (1903) with Socotran Orthoptera collected by Forbes and Ogilvie-Grant in 1898–1899. 1. *Scintharista forbesii* (Burr, 1899); 2. *Cataloipus brunneri* (Kirby, 1910); 3. *Teddia dioscoris* Burr, 1899; 4. *Oxytruxalis ensis* (Burr, 1899); 5. *Forficula smyrnensis* Audinet-Serville, 1839; 6. *Phaulotypus insularis* (Burr, 1899); 7. *Phaulotypus granti* Burr, 1899; 8. *Loboptera peculiaris* Burr, 1899.

In 1907, Krauss published a comprehensive overview of all Orthoptera known from Socotra and Abd el Kuri at that time, referring to earlier expeditions and mentioning the specimens collected by Riebeck, Bennet, Forbes & Ogilvie-Grant, and Simony (Krauss 1907).

From January to April 1953, British entomologist George Popov stayed on Socotra for the Desert Locust Survey, Nairobi and thoroughly studied the Orthoptera of Socotra. He collected 300 specimens and published his results with Sir Boris Uvarov, the most comprehensive

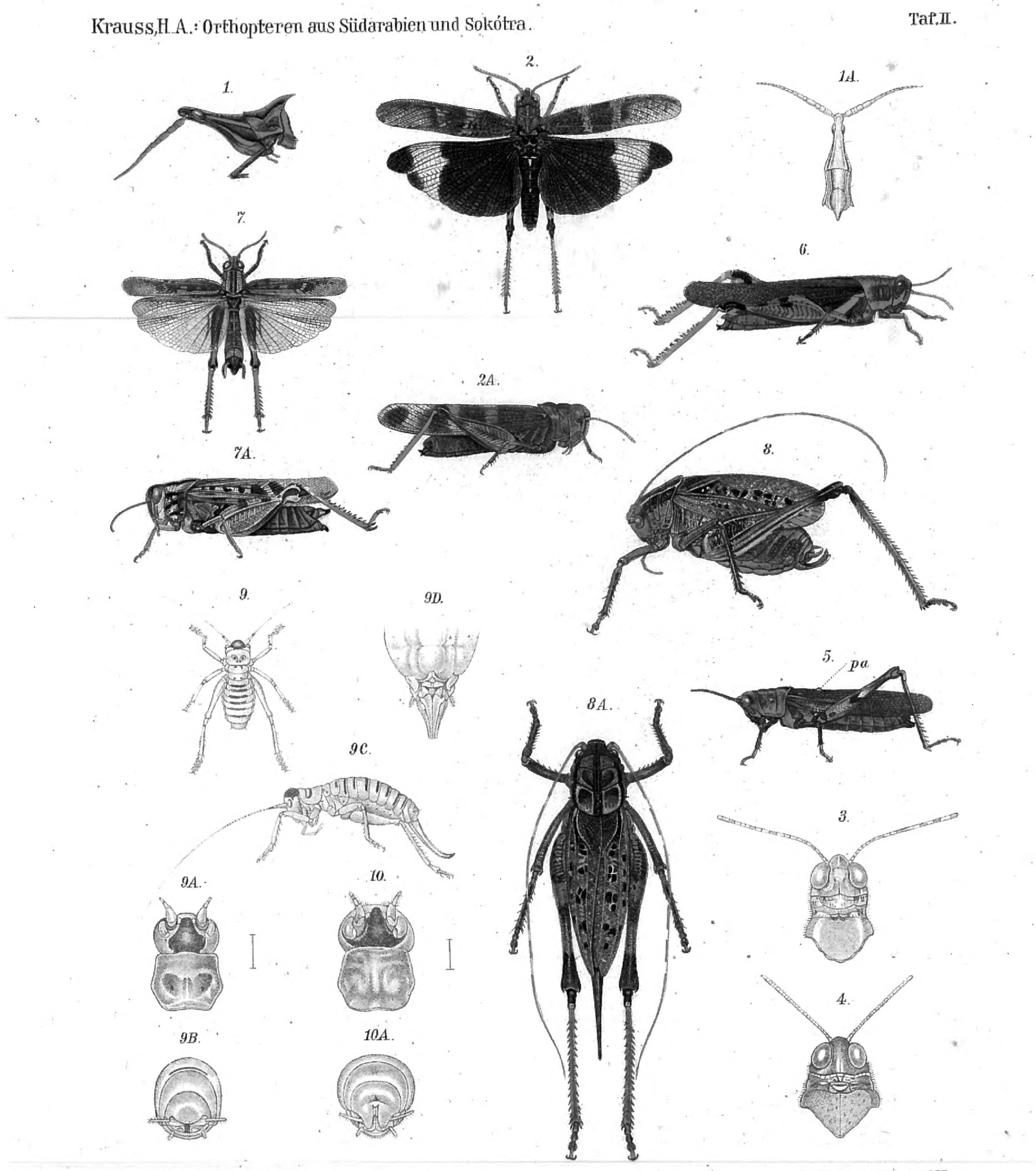

Figure 14. Plate from Krauss (1907) with some Orthoptera species collected by Oscar Simony in 1899. 1. *Truxalis viridifasciata* (Krauss, 1902); 2. *Scintharista forbesii* (Burr, 1899); 3. *Sphingonotus albipennis* Krauss, 1902; 4. *Sphingonotus ganglbaueri* Krauss, 1907; 5. *Physemophorus sokotranus* (Burr, 1898); 6. *Diabolocatantops axillaris* (Thunberg, 1815); 7. *Acorypha glaucopsis* (Walker, 1870); 8. *Pachysmopoda abbreviata* (Taschenberg, 1883); 9. *Glomeremus pileatus* (Krauss, 1902); 10. *Melaneremus atrotectus* (Brunner von Wattenwyl, 1888) (from India).

account of Socotran Orthoptera to date (Uvarov and Popov 1957). Later, Popov published separate papers about a selection of families based on his material (Tettigoniidae, Gryllacrididae, Thericleidae, Pamphagidae and Pyrgomorphidae) (Popov 1981, 1984, 1997). Popov's collection is deposited in the NHMUK.

The University of Oxford organised an expedition in 1956 led by Douglas Botting. The party stayed on the island from August to October 1956. The participant responsible for the collection of Orthoptera was Michael Gwynne, who collected some 250 specimens deposited in the NHMUK (not in Oxford).

In April 1967, the Middle East Command Expedition was the most important event of this period. Kenneth M. Guichard carried out the zoological observations and collected many orthopterans, more than 300 specimens, stored in the NHMUK. Amongst the taxa, several were new to science and some were new to Socotra (Guichard 1992). Guichard kept a notebook (Guichard 1967), which is now stored in the archives of the library of the NHMUK, a copy of which was sent to RF for exploration.

In more recent times, the most important collector of Socotran Orthoptera is Wolfgang Wranik, from the University of Rostock, who visited the Archipelago many times and collected on all four islands (Socotra, Samha, Darsa and Abd el Kuri) between 1982 and 2000. His 300 specimens are all deposited in the National Museum of Prague, Czech Republic. Wranik (2003) published a comprehensive book on the flora and fauna of the Socotra Archipelago, with the first photos of live specimens of Socotran Orthoptera and many specimens in collections.

The Czech biological research in 1999–2012, thoroughly described by Bezděk and Hájek (2017), has yielded a collection of nearly 200 specimens deposited in the National Museum, Prague, Czech Republic.

Francesca Pella from the University of Pavia collected some fifty specimens of Orthoptera during her studies in 2007–2009. That material is deposited in Pavia.

Several Italian scientists explored the entomological fauna of Socotra and also collected Orthoptera, the most important of them being Bruno Massa from Palermo. He visited Socotra with Attilio Carapezza in 2008 during a botanical exploration organised by the Botanical Garden of Palermo. Pietro Lo Cascio and Flavia Grita collected some specimens in 2009 and Attilio Carapezza revisited Socotra in 2014. Massa (2009, 2017) presents a selection of the collected species. Most of the material is deposited in Bruno's private collection in Palermo.

Methods

Dataset

We compiled and analysed a dataset of more than 2000 records of orthopterans from the Socotra Archipelago (Fig. 1) covering a survey period from 1896 to 2024 (Fig. 15). The dataset consists of specimens deposited at various institutions, literature data and field observations done by RF, JBo and RK in 2009 and 2010. Kay Van Damme and Francesca Pella provided several sight records from 2022. Additional observations were downloaded through GBIF.org (2024), containing data from Observation.org (2024) and iNaturalist contributors (2024), mainly from JBa.

All data can be found on the distribution maps. The collection specimens are mentioned in Suppl. material 1. Field observations are presented in Suppl. material 2.

Material examined

RF, JBo and RK collected on Socotra from 20 Feb – 5 Mar 2009 and from 25 Oct–7 Nov 2010. RF and JBo analysed specimens from Socotra in MNHN, NHMUK and NMW during visits to the individual museums between 2011 and 2018. RF identified specimens collected by Wolfgang Wranik, Czech scientists and Francesca Pella (NMPC). RF studied the collections of WML, OUMNH and MLUH from photographs of Socotran specimens, kindly provided by Tony Hunter and Ian Wallace (WML), Amoret Spooner and Darren Mann (OUMNH) and Hendrik Müller and Joachim Händel (MLUH).

Institutional abbreviations

BMPC Bruno Massa Collection, Palermo, Italy;
HDPC Hendrik Devriese Collection, Corbion, Belgium;
MLUH Martin Luther University Halle-Wittenberg, Germany;
MNHN National Museum of Natural History, Paris, France;
MSNG Natural History Museum Giacomo Doria, Genoa, Italy;
MSNPV Pavia University History Museum, Pavia, Italy;
NBC Naturalis Biodiversity Center, Leiden, the Netherlands;
NHMUK Natural History Museum, London, UK;
NMPC National Museum, Prague, Czech Republic;
NMW Natural History Museum, Vienna, Austria;
OUMNH Oxford University Museum of Natural History, Oxford, UK;
RFPC Rob Felix Collection, Nijmegen, the Netherlands;
WML World Museum Liverpool, UK.

Taxonomy

Taxonomy follows the Orthoptera Species File (OSF) (Cigliano et al. 2024a). We identified our specimens using Uvarov and Popov (1957) and made subsequent identifications using keys in the available literature, including original species descriptions. *Ochrilidia* specimens were identified with Jago (1977) and Mistshenko (1937), *Aiolopus* specimens with the key in Hollis (1968), *Heteracris*

specimens with Grunshaw (1991) and *Stenohippus* with Jago (1996). The abbreviations aff. and cf. in taxonomic names follow the syntax suggested by Lucas (1986).

Localities, coordinates and distribution maps

Most of the old museum specimens bear limited locality information, let alone coordinates of localities. Bezděk et al. (2012) gave an overview of all geographical names of localities on Socotra used in entomological literature in the past and provided coordinates. We used these coordinates to plot records without detailed locality information, roughly all records from before 2000, on a map (Fig. 15). Part of the localities were interpreted, based on maps and site descriptions in various publications (Forbes 1903; Gregory, 1903; Rebel 1907; Uvarov and Popov 1957; Guichard 1967; Doe 1992). In the material examined section (Suppl. material 1), interpreted and estimated coordinates are given between square brackets ([]). From 2000 onwards, records are based on accurate coordinates, present on specimen labels or, in case of field observations, taken from GPS readings.

Locality names in the main text follow Bezděk et al. (2012), while, in the material examined section (Suppl. material 1), we cite the original spelling of the localities, added with the spelling according to Bezděk et al. (2012) between square brackets. Data missing on the label, but mentioned in literature or interpreted, based on maps is also shown in square brackets. We estimated data lacking on labels of museum specimens or in original literature, based on coordinates in GIS.

We obtained elevation data through Jarvis et al. (2008). We created the base map using ArcGIS® software by Esri (Copyright © Esri) and adopted the elevation zones depicted in the maps from Brown and Mies (2012), who distinguished the following five elevation belts linked to different vegetation types: Coastal zone: 0–200 m a.s.l.; Low elevation slopes: 200–400 m a.s.l.; Medium elevation slopes: 400–700 m a.s.l.; Montane 700–1200 m a.s.l.; High montane 1200–1540 m a.s.l.

For habitat descriptions, we derived information on vegetation types from a GIS file provided by Ing. Petr Vahalík, Ph.D. of Mendel University in Brno, Czech Republic.

Bioacoustics

Sound recordings were made by RF using an M-Audio MicroTrack II with a Sennheiser microphone, module K6 and head ME40. Unfortunately, no data on temperature were noted. The song files were sampled at 96 kHz and 24 bits and analysed with Wavelab Pro 11.2 software and Wildlife Acoustics Kaleidoscope 5.6.3 software. Oscillograms were usually prepared after filtering low-frequency noise to obtain a clearer picture. Oscillograms were made with Praat 6.2.22 software and spectrograms with Wildlife Acoustics Kaleidoscope 5.6.3 software.

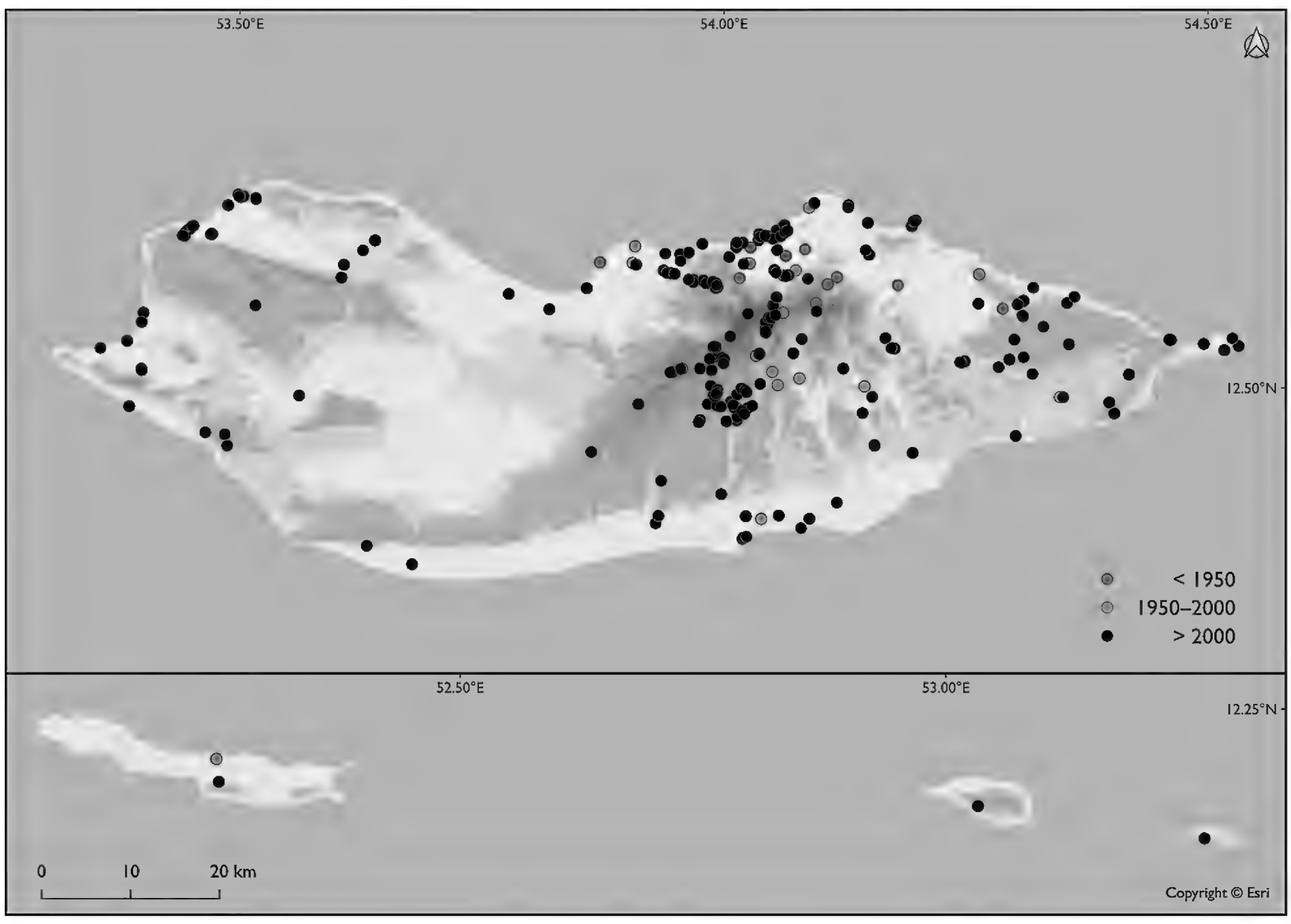

Figure 15. Localities with Orthoptera records in the Socotra Archipelago, covering a survey period from 1896 to 2024.

Bioacoustics terminology

For bioacoustics terminology, we follow Baker and Chesmore (2020).

Sound elements

Pulse: indivisible unit of sound, typically corresponding to a single tooth impact; syllable: sound produced with a single complete stridulatory movement (the opening and closing of the tegmina in Ensifera, the up and down motion of the femora against the tegmina in Acrididae); hemi-syllable: sound produced with only one of the motion directions of a syllable; two hemi-syllables may be audible within a syllable; echeme: first-order assemblage of syllables; echeme-sequence: first-order assemblage of echemes (may include individual syllables that precede or follow the echeme).

Sound spacing of pulses, syllables and echemes in time

Duration: duration of the element itself (in s or ms); interval: duration of the silence between the elements (in s or ms); period: duration of one element, including the interval with the next element; repetition rate: number of elements repeated per unit of time (per s or minute).

The sound descriptions in this paper are based on the available sound recordings, thus, sometimes only on the song of one specimen.

Biometric terminology

The terminology that describes the genitalia of Gryllidae follows Desutter (1987), Desutter-Grandcolas (2003) and De Campos and Desutter-Grandcolas (2020). Terminology in Ragge (1955) is followed for veins of the Caelifera, terminology in Desutter-Grandcolas (2003) and Robillard and Desutter-Grandcolas (2004) for wing venation in Grylloidea. Mounted specimens were measured with a digital calliper (precision 0.01 mm). Smaller body parts were measured through a Novex zoom RZT-SF stereomicroscope in combination with an object micrometre glass slide.

For the species description of *Oecanthus castaneus* Felix & Bouwman, sp. nov. and other species accounts, the following measurements were made: body length (from the tip of the labrum to the apex of the subgenital plate), pronotum length (from anterior to posterior margin along the mid-line), pronotum width (at the widest part in dorsal view), tegminal length (from the thorax joining point to the distal end of tegmina along the mid-line), tegminal width of the right tegmen (measured at the widest section of the tegmina at rest or the maximum width of the dorsal field of the right tegmen excluding the lateral folds), total tegminal width of the right tegmen (maximum width of the dorsal field and the lateral fold together), hind femur length, hind tibia length and cerci length. The male stridulatory file length was measured along the ventral surface of the right tegmen's first anal vein (file). The female ovipositor was measured from the base of the subgenital plate to the distal tip.

Biometric abbreviations

FI, FII, FIII	fore, median, hind femur
iad	inner, apical, dorsal
iav	inner, apical, ventral
oad	outer, apical, dorsal
oav	outer, apical, ventral
TI, TII, TIII	fore, median, hind tibia

Abbreviations genitalia

DP	Distal prolongation of the Arc
EctAp	Ectophallic Apodeme
EndC	Endophallic Cavity
MLPs	Main Lobes of the Pseudepiphallus
Ps	Pseudepiphallus
PsAp	Pseudepiphallic Apodemes
PsP	Pseudepiphallic Parameres
R	Ramus
ScEEI	Lateral Sclerotisation of the Epi-Ectophallic Invagination ("Endoparameres").

Red List assessment

Red List assessments of 29 endemic species are based on our above-mentioned dataset of orthopterans from the Socotra Archipelago. The assessments followed the criteria to evaluate if a taxon belongs to an IUCN Red List threatened category (IUCN Standards and Petitions Committee 2022). Due to data limitations, using all five IUCN criteria categories to assess the 29 Orthoptera species was impossible. No population status or trends information was available, nor was there data to enable quantitative analysis. Therefore, assessments were only feasible, based on criteria B and D2. Both criteria rely on the geographic distribution of a species and two parameters: area of occupancy (AOO) and extent of occurrence (EOO).

The AOO of the 29 Orthoptera species under investigation was calculated by summing the total area of 2 × 2 km grid squares occupied. The estimated geographic distribution was determined as polygonal spatial data using point data and habitat information. Rules outlined in the IUCN Mapping Standards were followed (IUCN SSC Red List Technical Working Group 2021). Supporting information included a digital elevation model, the outline of the landmass and a vegetation map of Socotra. The lower EOO was determined using the minimum convex hull around confirmed occurrences, while the upper EOO was calculated using the minimum convex hull encompassing the entire estimated geographical range, which may overestimate its actual distribution.

All data have been entered into the Species Information Service (SIS), IUCN's central database, including

information on geographic distribution, threats, habitat, existing conservation measures and a range of additional information that provided further insight into each species. The SIS automatically calculated the threat category based on the input data. At the time of submission of this paper, the assessments await their review by an IUCN representative. A detailed description of the assessment methodology is provided in Pahm (2023).

Results

In the Socotra Archipelago, 65 taxa of Orthoptera occur, 64 of which are resident species (Table 2). There are nine endemic genera, 30 known endemic species, one endemic subspecies and several unidentified taxa. Comprehensive species accounts are provided in the following paragraphs.

Table 2. List of 65 Orthoptera taxa known to occur in the Socotra Archipelago. One non-resident species is indicated with I. The endemics are indicated with an E, endemic genera with an E^G and endemic tribes with E^T.

	Endemic	Socotra	Darsa	Samha	Abd el Kuri
Suborder CAELIFERA					
Superfamily Acridoidea					
Family Acrididae					
Subfamily Acridinae					
Tribe Truxalini					
Oxytruxalis ensis (Burr, 1899)	E^G	*			
Truxalis viridifasciata (Krauss, 1902)	E	*			
Subfamily Calliptaminae					
Acorypha bimaculata (Krauss, 1902)	E	*		*	
Acorypha glaucopsis (Walker, 1870)		*	*	*	
Subfamily Catantopinae					
Diabolocatantops axillaris (Thunberg, 1815)		*			
Dioscoridus depressus Popov, 1957	E^G	*			
Subfamily Cyrtacanthacridinae					
Anacridium melanorhodon arabafrum Dirsh & Uvarov, 1953		*			
Cyrtacanthacris tatarica (Linnaeus, 1758)		*			
Schistocerca gregaria (Forskål, 1775)		*			
Subfamily Eyprepocnemidinae					
Cataloipus brunneri (Kirby, 1910)	E	*			
Heteracris adspersa (Redtenbacher, 1889)		*			
Heteracris annulosa Walker, 1870					*
Heteracris coerulescens (Stål, 1876)		*			
Subfamily Gomphocerinae					
Ermia variabilis Popov, 1957	E	*			
Ochrilidia cf. *O. geniculata* (Bolívar, 1913)					*
Ochrilidia gracilis nyuki (Sjösted, 1909)		*			
Ochrilidia socotrae Massa, 2009	E	*			
Stenohippus socotranus (Popov, 1957)	E	*			
Subfamily Oedipodinae					
Acrotylus incarnatus Krauss, 1907	E	*			
Acrotylus innotatus Uvarov, 1933		*			
Aiolopus thalassinus (Fabricius, 1781)		*			
Oedaleus senegalensis (Krauss, 1877)		*			
Scintharista forbesii (Burr, 1899)	E	*			
Scintharista notabilis (Walker, 1870)		*			*
Sphingonotus (*Neosphingonotus*) *canariensis* Saussure, 1884		*			
Sphingonotus (*Parasphingonotus*) *turkanae* Uvarov, 1938		*			
Sphingonotus (*S.*) *albipennis* Krauss, 1902	E				*
Sphingonotus (*S.*) *balteatus* (Serville, 1838)					*
Sphingonotus (*S.*) *ganglbaueri* Krauss, 1907	E	*		*	
Sphingonotus (*S.*) *insularis* (Popov, 1957)	E	*		*	
Sphingonotus (*S.*) *rubescens* (Walker, 1870)		*		*	

	Endemic	Socotra	Darsa	Samha	Abd el Kuri
Superfamily Eumastacoidea					
Family Thericleidae					
Subfamily Plagiotriptinae					
Tribe Phaulotypini					
Phaulotypus dioscoridus (Popov, 1957)	E^G	*			
Phaulotypus granti Burr, 1899	E^G	*			
Phaulotypus insularis (Burr, 1899)	E^G	*			
Phaulotypus socotranus (Popov, 1957)	E^G	*			
Tribe Socotrellini	E^T				
Socotrella monstrosa Popov, 1957	E^G	*			
Superfamily Pyrgomorphoidea					
Family Pyrgomorphidae					
Subfamily Pyrgomorphinae					
Tribe Dictyophorini					
Dictyophorus griseus (Reiche & Fairmaire, 1850)		I			
Tribe Phymateini					
Physemophorus sokotranus (Burr, 1898)	E^G	*			
Tribe Pyrgomorphini					
Pyrgomorpha conica kurii Hsiung & Kevan, 1975	E				*
Pyrgomorpha tereticornis (Brullé, 1840)		*	*	*	
Tribe Sphenariini					
Xenephias socotranus Kevan, 1973	E^G	*			
Superfamily Tetrigoidea					
Family Tetrigidae					
Paratettix subpustulatus (Walker, 1871)		*			
Suborder ENSIFERA					
Superfamily Grylloidea					
Family Gryllidae					
Subfamily Gryllinae					
Tribe Gryllini					
Acheta cf. *A. domesticus* (Linnaeus, 1758)		*			
Acheta rufopictus Uvarov, 1957	E	*			
Gryllodes sigillatus (Walker, 1869)		*			
Gryllus bimaculatus De Geer, 1773		*			
Tribe Modicogryllini					
Eumodicogryllus chivensis (Tarbinsky, 1930)		*			
Modicogryllus perplexus Otte & Cade, 1984		*			
Family Mogoplistidae					
Subfamily Mogoplistinae					
Tribe Arachnocephalini					
Ectatoderus guichardi Gorochov, 1993	E	*			
Ectatoderus sp. 2	?	*			
Ectatoderus sp. 3	?	*			

	Endemic	Socotra	Darsa	Samha	Abd el Kuri
Tribe Mogoplistini					
Mogoplistes aff. *M. brunneus*	?	*			
Family Oecanthidae					
Subfamily Oecanthinae					
Tribe Oecanthini					
Oecanthus castaneus Felix & Bouwman, sp. nov.	E	*			
Oecanthus chopardi Uvarov, 1957	E	*		?	
Family Phalangopsidae					
Subfamily Phalangopsinae					
Socotracris kleukersi Felix & Desutter-Grandcolas, 2012	E[G]	*			
Family Trigonidiidae					
Subfamily Trigonidiinae					
Trigonidium cicindeloides Rambur, 1838		*			
Superfamily Gryllotalpoidea					
Family Gryllotalpidae					
Gryllotalpa aff. *G. africana* Palisot de Beauvois, 1820		*			

	Endemic	Socotra	Darsa	Samha	Abd el Kuri
Superfamily Stenopelmatoidea					
Family Gryllacrididae					
Glomeremus capitatus Uvarov, 1957	E	*			
Glomeremus mediopictus Uvarov, 1957	E	*			
Glomeremus pileatus (Krauss, 1902)	E	*			
Superfamily Tettigonioidea					
Family Tettigoniidae					
Subfamily Conocephalinae					
Tribe Conocephalini					
Conocephalus maculatus (Le Guillou, 1884)		*			
Tribe Copiphorini					
Ruspolia aff. *R. basiguttata* (Bolívar, 1906)		*			
Subfamily Mecopodinae					
Pachysmopoda abbreviata (Taschenberg, 1883)	E[G]	*			
Subfamily Phaneropterinae					
Phaneroptera sparsa Stål, 1857		*			
Phaneroptila insularis Uvarov, 1957	E[G]	*			

Identification key to the Orthoptera in the Socotra Archipelago

The following identification key can be used to identify adults of all known species of Orthoptera in the Socotra Archipelago, except for the different species of *Ectatoderus*. The key is unsuitable for identifying nymphs. It is an adapted combination of the keys published in Dirsh (1965), Jago (1967), Harz (1969, 1975), Descamps (1977), Popov (1981, 1997), Grunshaw (1991), Husemann et al. (2011), Defaut and Morichon (2015), Rowell and Hemp (2017, 2018, 2021) and Hemp and Rowell (2020).

It is beyond the scope of this paper to illustrate all body parts used as characters in the key. For this purpose, we kindly refer to additional resources available elsewhere.

1a Antennae short, not much longer than head and pronotum together, always with less than 30 segments; hearing organs (if present) on each side of the base of the abdomen **CAELIFERA (2)**

1b Antennae longer than the body, composed of more than 30 segments; hearing organs (if present) near the base of the fore tibiae **ENSIFERA (44)**

Caelifera

2a Pronotum strongly elongated, covering the whole or a significant part of the abdomen, (almost) reaching its tip (Fig. 130); tarsi of the fore and middle legs with two segments, no arolium between the claws **Tetrigoidea – Tetrigidae – *Paratettix subpustulatus***

2b Pronotum not produced backwards along the abdomen; tarsi with three segments and with an arolium between the claws **3**

3a Outer side of the basal segment of the hind tarsi proximally with a tubercle and distally with a tooth; dorso-median carina of the hind tibiae serrated, armed with spines (Fig. 105); body strongly laterally compressed, if not, then strongly rugose **Eumastacoidea – Thericleidae (4)**

3b Basal segment of the hind tarsi without a tubercle and a tooth; dorsal carina of the hind tibiae not serrated or armed with spines **8**

4a Body strongly rugose, not compressed laterally (Fig. 115); the vertex of the fastigium laterally compressed and strongly projecting forward, in front of the eyes; ten antennal segments; antennal organ on the ninth segment ***Socotrella monstrosa***

4b Body never strongly rugose, compressed bilaterally (Fig. 113); vertex of the fastigium projecting above the eyes, not in front of the eyes; nine antennal segments; antennal organ on the eighth segment ***Phaulotypus* (5)**

5a Female pronotum strongly produced posteriorly in a sharp angle, covering the meso- and metanotum (Fig. 105); dorso-median carina of the hind femora in males armed with small spines (Fig. 104) **6**

5b Female pronotum not projecting posteriorly, not covering the meso- and metanotum (Fig. 108); armature of the hind femora in males stronger (Fig. 107) **7**

6a Apex of the head in males strongly projecting above the upper level of the eyes; length of the female pronotum along the median carina more than the length of the hind margin of the lateral pronotal lobe (Figs 101, 104) ***Phaulotypus granti***

6b Apex of the head in males less prominent, length of the median pronotal carina in females less than the hind margin of the pronotal lobe (Fig. 102) ***Phaulotypus dioscoridus***

7a Lower carina of the hind femora strongly rugulose in both sexes; pronotum in profile evenly convex; abdomen with a dark longitudinal dorso-median stripe ***Phaulotypus socotranus***

7b Lower carina of the hind femora smooth; male pronotum in profile strongly arcuate and gibbose, without a dark dorso-median stripe ***Phaulotypus insularis***

8a Fastigial furrow at the tip of the frons present, visible from above; ventral lobes of the hind knees longer than the dorsal lobes **Pyrgomorphoidea – Pyrgomorphidae (9)**

8b Fastigial furrow absent; ventral lobes of the hind knees shorter than or equal to the dorsal lobes **Acridoidea – Acrididae (13)**

9a Apterous species (Fig. 128) ***Xenephias socotranus***

9b Fully-winged species **10**

10a First tergite dorsally with a knob-like tubercle, visible with closed tegmina, because of a bend in the hind margin of both tegmina (Fig. 122) ***Physemophorus sokotranus***

10b No tubercle on the first tergite **11**

11a Head not conical. Large, robust black species with reddish tones. Tegmina broad, with a rounded apex. Pronotum heavily sculptured, in profile with a raised, rounded frontal hump (Fig. 117) ***Dictyophorus griseus***

11b Head conical. Smaller species, slender, with narrow, pointed tegmina; pronotum different ***Pyrgomorpha* (12)**

12a Occurring on Socotra, Darsa and Samha; the sides of the frontal half of the female pronotum parallel or almost so, only subtly diverging posteriorly ***Pyrgomorpha tereticornis***

12b Occurring on Abd el Kuri; with a more robust appearance; the sides of the whole female pronotum diverging posteriorly over its entire length ***Pyrgomorpha conica kurii***

13a Prosternal process present **14**

13b Prosternal process absent; if present, then the body is elongated and the antennae are blade-like and flattened **25**

14a Mesosternal lobes rectangular **Cyrtacanthacridinae (15)**

14b Mesosternal lobes rounded, obtuse-angular or acute-angular, but never rectangular **17**

15a Prosternal process strongly curved backwards, touching or almost touching the mesosternum, inflated in the middle, with an acutely or subacutely conical apex; male subgenital plate acutely conical; pronotum moderately tectiform, slightly constricted; integument finely rugose or dotted, almost smooth; male cercus with a subacute apex; hind wings lemon-yellowish ***Cyrtacanthacris tatarica***

15b Prosternal process straight or slightly inclined backwards, conical, cylindrical or compressed; male subgenital plate bilobate or trilobate; pronotum in the middle constricted. **16**

16a Male subgenital plate deeply bilobate; cerci wide, lamelliformly compressed, with an almost truncate, slightly excised apical margin. ***Schistocerca gregaria***

16b Male subgenital plate deeply trilobate; cerci not compressed, subconical, narrow, incurved and upcurved ***Anacridium melanorhodon arabafrum***

17a Male cerci incurved, clasping, pincers-like **Calliptaminae (18)**

17b Male cerci variable, but not incurved nor pincers-like **19**

18a Inner side of the hind femora solid black; ratio of the length to the height of the hind femora greater than 2.8; ventral femoral carina lower than the dorsal one ***Acorypha bimaculata***

18b Inner side of the hind femora yellow (with or without separate spots); ratio of the length to the height of the hind femora less than 2.8; femoral carinas high, with the dorsal and ventral of more or less the same height; ventral carina whitish. ***Acorypha glaucopsis***

19a Pronotum flat or weakly roof-like dorsally, with linear lateral and medial carinae (lateral carinae sometimes weak or absent); male cerci often bilaterally compressed, apically lobiform or subacute, downcurved apically **Eyprepocnemidinae (20)**

19b Pronotum of variable shape; lateral carinae, if present, not linear. Male cerci variable, but never strongly bilaterally compressed and rounded lobiform at its tip, but usually straight or upcurved apically **Catantopinae (24)**

20a Apex of the subgenital plate excised; cerci moderately wide, gradually narrowing towards the apex, the distal part being gently, in- and downwardly curved, with an acute apex, often oblique on the upper edge (Fig. 34) ***Cataloipus brunneri***

20b Apex of the subgenital plate without a notch; cerci bilaterally flattened, downcurved in the apical part, adapted as flat clasping structures ***Heteracris* (21)**

21a Apex of the subgenital plate with two tubercles; the external median surface of the hind femora with extensive dark transverse bands reaching the middle line; lateral surface of the head yellow-brown or light green; a distinctive yellowish stripe behind the eyes (Figs 36, 38) ***Heteracris adspersa***

22b Apex of the subgenital plate without a pair of tubercles 23

23a General colouration of the male brown with two yellow or yellow-green dorsolateral stripes; tegmina unicolorous infuscate brown, with dorsal longitudinal yellow-green stripe; external surface of posterior femora dull brown without boldly marked spots or transverse bands, sometimes with an indistinct distal band before the dull cream-yellow pre-genicular annulae (Fig. 41); hind wings blue at their base ***Heteracris coerulescens***

23b General colouration variable; tegmina with large brown spots merging to form transverse bands; external femoral markings variable, generally with median and distal spots, but sometimes absent; if present, median spots never extending to the median line; hind wings colourless ***Heteracris annulosa***

24a Completely apterous; body cylindrical, somewhat depressed with a light longitudinal line along the mid-dorsal axis from the fastigium to the abdomen's tip; two irregularly swollen ridges on the pronotum's sides represent the lateral carinae (Fig. 27) ***Dioscoridus depressus***

24b Fully winged; body shape different than above; characteristic vertical whitish line on the posterior margins of the metathorax (Fig. 25) ***Diabolocatantops axillaris***

25a Large, slender species with strongly elongated, almost stick-like bodies; head elongated and conical with a long fastigium and an incurved, sloping frons; antennae ensiform; hind wings with a tessellated pattern formed by dark transverse veinlets (Figs 16, 17, 19) **Acridinae (26)**

25b Other combinations of characters, not like Figs 16, 17, 19 **27**

26a Antennae longer than the head and pronotum together; pronotum strongly elongated, almost flat; tegmina very long, gradually narrowed and pointed in the apical half; hind wings much shorter than the tegmina; internal upper lateral lobes of the hind knees elongated and much longer than the external upper lobes (Figs 16, 17) ***Oxytruxalis ensis***

26b Antennae shorter than the head and pronotum combined, pronotum saddle-shaped, tegmina more abruptly narrowed and obtusely pointed apically, hind wings somewhat shorter than the tegmina; internal and external upper lateral lobes of the hind knees equal in length (Fig. 19) ***Truxalis viridifasciata***

27a Head subconical with a sloping frons relative to the vertex; temporal foveolae always present; stridulatory mechanism consisting of a serrated vein in the tegmen (primarily the radius) and a file of pegs on the lower edge of the inner area of the male hind femur; hind wings always hyaline without dark markings. **Gomphocerinae (28)**

27b Head subglobular with vertical frons relative to the vertex; temporal foveolae absent or irregularly indistinct, except in *Aiolopus*; medial area of the tegmen with a raised and often serrated intercalary vein serving as stridulatory mechanism; hind wings often brightly coloured with or without dark wing bands, except in *Aiolopus* and some *Sphingonotus* **Oedipodinae (32)**

28a Short vestigial wings on the sides of the body; small species with a relatively large head, strongly sloping frons, ensiform antennae and large elongated eyes ***Ermia variabilis***

28b Fully winged; tegmina posteriorly passing the hind knees **29**

29a Small; antennae filiform; pronotum slightly constricted in the prozona with angularly incurved lateral carinae ***Stenohippus socotranus***

29b Small to medium-sized; antennae ensiform; lateral carinae of the pronotum straight and parallel or slightly diverging posteriorly, not constricted ***Ochrilidia*** **(30)**

30a Length of the fastigium of the vertex in front of the eyes, in dorsal view, more than the maximum width of the vertex at the frontal edge of the eyes; temporal foveolae invisible when seen from above (Fig. 47); lower inner lobes of the hind knees without a black dot ***Ochrilidia gracilis nyuki***

30b Length of the fastigium of the vertex in front of the eyes equal to the width of the vertex at the frontal edge of the eyes, in dorsal view; lower edges of the temporal foveolae partly or well visible from above; lower inner lobes of the hind knees with a block dot **31**

31a Larger size; lower edges of the temporal foveolae completely visible from above; within the Archipelago only known from Abd el Kuri ***Ochrilidia geniculata***

31b Smaller size; lower edges of the temporal foveolae partly visible from above; within the Archipelago only known from Socotra ***Ochrilidia socotrae***

32a Pronotum as long as, or shorter than its width, strongly saddle-shaped; lateral lobes of the pronotum with a dark spot with an off-central white dot; hind wings basally orange or pinkish-red, without a dark fascia, but sometimes with some dark spots in the apex ***Acrotylus*** **(33)**

32b Pronotum of variable shape, but always longer than its width **34**

33a Pronotum with a rounded posterior margin; first half of the prozona of the pronotum gently sloping (Figs 59, 64C, F); hind wings basally orange-red (Fig. 65) ***Acrotylus incarnatus***

33b Pronotum rather rugose with a subrounded to slightly angular posterior margin; frontal half of the prozona in lateral view step-like raised (Fig. 64A, B, D, E); hind wings basally pinkish-red and apically slightly infumated, often with prominent black apical spots (Figs 63, 65B) ***Acrotylus innotatus***

34a Frons sloping (Fig. 67); temporal foveolae well developed, elongate, trapezoidal; pronotum weakly saddle-shaped, dorsally flat, with a clear but low median carina, cut by one or two transverse sulci; pronotum without lateral carinae (be aware of the contrasting pattern of two white incurved lines bordered by dark markings, suggesting the presence of two lateral carinae); hind wings hyaline or with a greenish hue, slightly infumated in the apex and posterior margin; fastigium of the vertex concave; species of relatively moist habitats ***Aiolopus thalassinus***

34b Frons slightly sloping to straight, relatively to the vertex (Fig. 70); hind wing basally often colourful with or without a dark fascia, sometimes hyaline with or without a blue hue **35**

35a Median carina of the pronotum straight, not interrupted by one or more transverse sulci; hind wings basally yellowish, apex hyaline, with a dark fascia in between; pronotum marked with an X-shaped pattern ***Oedaleus senegalensis***

35b Median carina of the pronotum incomplete or complete, but always interrupted by one or more transverse sulci **36**

36a Viewed in profile, the head positioned on the same level as the pronotum; pronotal median carina well marked along the entire length of the pronotum, clearly raised and only interrupted by the principal sulcus; robust species ***Scintharista*** **(37)**

36b Viewed in profile, the head clearly rises above the pronotum; pronotal median carina weak or only developed in the first half of the prozona and metazona, interrupted by more than one transverse sulci; slender species, except for the rather stout *Sphingonotus insularis* ***Sphingonotus*** **(38)**

37a Hind wings pure black, except for a hyaline band bordering the infumated apex (Fig. 73) ***Scintharista forbesii***

37b Hind wings basally yellow to red with a dark fascia and a black apex (Fig. 76) ***Scintharista notabilis***

38a Male intercalary vein in the medial area of tegmina serrate, projecting above the radial and medial veins, in females sometimes less serrate or smooth; radial area at the same level as the medial area, without cross veinlets between the radial and medial veins; ***Sphingonotus s.s*** **(40)**

38b Male intercalary vein in the medial area of the tegmina smooth (very rarely with serration), not projecting above the radial and medial veins **39**

39a Hind wings hyaline with a narrow complete dark fascia continuing on the anal fan; thickened cross veinlets between the radial and medial veins (less developed in females), which project above the intercalary vein; radial vein without serration ***Sphingonotus* (*Neosphingonotus*) *canariensis***

39b Hind wings hyaline; radial vein serrated and stronger raised than the subcostal vein; without thickened cross veinlets between the radial and medial veins; smaller species; supra-anal plate trilobite ***Sphingonotus* (*Parasphingonotus*) *turkanae***

40a Large species; hind wings basally violet or purple with an extensive black fascia and a hyaline apex (Fig. 88); inner side of the hind tibiae bluish or bluish-grey; only recorded on Abd el Kuri ***Sphingonotus* (*S.*) *balteatus***

40b Smaller species with hyaline or basally light blue hind wings, without a dark fascia or with an incomplete fascia formed by a row of dark spots **41**

41a Robust species, with strongly undulated margins of the pronotum; sudden notch in the dorsal carina of the hind femora, close to the knee; hind wings basally light blue with a short, often incomplete fascia not reaching the hind margin and covering only the first anal veins; male supra-anal plate trilobate and deep blue in the male ***Sphingonotus* (*S.*) *insularis***

41b Slender species without the above characters **42**

42a Hind wings hyaline; transverse bands of the tegmina weakly defined with discontinuous margins (particularly the second and the third band), usually built by a variable number of speckles; pronotum dorsally flat, prozona at the same level as the metazona, the latter with weak "shoulders", formed by the lateral carinae; intercalary vein variable, but never straight, often clearly sinuous with apical part almost touching the medial vein; apical part of the second branch of the radial vein with three branches; male supra-anal plate triangular, gradually narrowing towards the apex (sometimes with a slight hint of two lateral lobes, hence irregular triangular) ***Sphingonotus* (*S.*) *rubescens***

42b Hind wings hyaline, sometimes with a bluish hue and a hint of a dark fascia; transverse bands of the tegmina distinct and continuous (particularly the first and second band, mostly also the third); pronotum dorsally unevenly levelled, with a depressed prozona and an elevated metazona, separated from each other by a clear and deep principle sulcus; metazona with strong "shoulders", formed by the lateral carinae; intercalary vein variable; apical part of the second branch of the radial vein with two branches; male supra-anal plate pentagonal with two lateral lobes and a median lobe **43**

43a Socotra, Samha; posterior margin of the pronotum acutely angled, frons vertical relative to the vertex; hind femora shorter; hind wings hyaline or basally with a hint of a bluish hue, often with a trace of a smoky dark fascia ***Sphingonotus* (*S.*) *ganglbaueri***

43b Abd el Kuri; posterior margin of the pronotum obtusely angled; frons sloping relative to the vertex; hind femora longer; hind wings whitish/hyaline, never with a bluish hue, sometimes with a trace of a dark fascia ***Sphingonotus* (*S.*) *albipennis***

Ensifera

44a Tarsi with three segments **45**

44b Tarsi with four segments **57**

45a Forelegs modified for digging habits Gryllotalpoidea **– *Gryllotalpa* aff. *G. africana***

45b Forelegs similar to the mid-legs **46**

46a Cerci very long and thin, much longer than the body; habitus as in Fig. 178; cave-dwelling species **Phalangopsidae – *Socotracris kleukersi***

46b Cerci not longer than the body, not cave-dwelling **47**

47a Small, shiny black cricket, except for light brown to orange-red hind legs and cerci (Fig. 180); body length smaller than 5 mm; marshy habitats ***Trigonidium cicindeloides***
47b Habitus different **48**

48a Small, flat, dull crickets, covered with small, flaky scales; posterior tibiae without spines, only finely serrulated on the superior margins (but with apical spurs) **Mogoplistidae (49)**
48b Habitus different **50**

49a Male pronotum strongly prolonged backwards, broadly rounded, smooth and completely covering the wings; female apterous; habitus as Fig. 153 ***Ectatoderus* spp.**
49b Male pronotum not strongly prolonged backwards; both male and female apterous; habitus as Fig. 161 ***Mogoplistes* aff. *M. brunneus***

50a Head more or less elongated; body depressed and slender; delicate creatures with a habitus as in Fig. 162; tegmina glassy, long, extending beyond the tip of the abdomen ***Oecanthus* (51)**
50b Head roundish, broader than long; body cylindrical (Fig. 132) **Gryllidae – Gryllinae (52)**

51a Colour pale straw to whitish, with sometimes greenish tones; two small dark spots on the tegmina Figs 173, 174); apex of the lobe of the hind knee tipped black (Fig. 165B); female cerci > 4.5 mm; ovipositor > 5.0 mm ***Oecanthus chopardi***
51b Colour warm brown with extensive dark markings on the wing (Fig. 162); lobe of the hind knee dorsally lined black (Fig. 165A); female cerci < 4.0 mm; ovipositor < 4.5 mm ***Oecanthus castaneus* Felix & Bouwman, sp. nov.**

52a Length > 1.9 cm; large all-black cricket, including the head; only two yellow markings at the base of the tegmina ***Gryllus bimaculatus***
52b Length < 1.9 cm; colour different; head never wholly black, always with some light, yellowish spots or stripes on the occiput, behind the eyes or around the ocelli; legs light **53**

53a Male tegmina truncated, posterior margin rounded square, reaching halfway through the abdomen; females with tiny, reduced scaly wings; pronotum seen from aside longer than high, with a dark hind margin; head light with a broad dark line between the eyes ***Gryllodes sigillatus***
53b Male tegmina not truncated, if somewhat shortened, then posterior margin rounded, not rounded square; female tegmina developed; pronotum in lateral view as long as high **54**

54a Larger species, body length more than 14 cm; male tegmina with four harp veins **Gryllinae – Gryllini (55)**
54b Smaller species, body length less than 14 cm; male tegmina with two harp veins **Gryllinae – Modicogryllini (56)**

55a Head yellowishbrown, with broad dark bands on the occiput and between the eyes, with a darkly marked frons; pronotum with a characteristic pattern of dark spots ***Acheta* cf. *domesticus***
55b Head dark reddish-brown to black, with only light median and lateral ocelli and a light spot behind the eye (Fig. 134); pronotum uniformly blackish-brown on the disc, sometimes with a reddish hue and with a light hind margin and lateral lobes with a broadly yellowish margin ***Acheta rufopictus***

56a Epistomal suture (between frons and clypeus) slightly curved, with an obtuse angle and a rounded apex ***Modicogryllus perplexus***
56b Epistomal suture strongly curved, forming an almost right angle with a sharp apex (Fig. 144) ***Eumodicogryllus chivensis***

57a Typical bush-crickets; fully winged, with fore- and hind wings; tympanum present on the fore tibiae **Tettigonioidea (58)**
57b Cylindrical, sandy-coloured, non-jumping crickets with soft, fleshy bodies, covered by black markings; wing-less or with very small vestigial wings as scales on the side of the body; no tympanum on the fore tibiae **Stenopelmatoidea – Gryllacrididae (62)**

58a Huge, stout, unmistakable reddish-brown or green bush-cricket, with broad, rounded and heavily veined tegmina, dotted with little creamy spots and some larger black ones (Fig. 208) ***Pachysmopoda abbreviata***
58b Habitus different, body more slender and delicate, without black markings **59**

59a	Head more or less pointed because of a strongly sloping frons relative to the vertex	**Conocephalinae (60)**
59b	Head globose, not markedly inclined; frons vertical relative to vertex	**Phaneropterinae (61)**
60a	Smaller species; body size including wings in males less than 27 mm, in females less than 30 mm; greyish band extending from the frons to the posterior margin of the pronotum	***Conocephalus maculatus***
60b	Larger species; body size including wings always more than 35 mm	***Ruspolia* aff. *R. basiguttata***
61a	Hind wings shorter than or of the same length as the tegmina; habitus as in Fig. 216	***Phaneroptila insularis***
61b	Hind wings much longer than the tegmina, extending a quarter of their length beyond the tegmina; habitus as in Fig. 213	***Phaneroptera sparsa***
62a	Smaller species; tiny scale-like wings present; head yellow; habitus as in Fig. 198	***Glomeremus mediopictus***
62b	Larger species; wing-less; head with a dorsal black spot	**63**
63a	Two black markings on the pronotum: one on the anterior, one on the posterior margin, as in Fig. 185	***Glomeremus capitatus***
63b	Two black or reddish markings in the centre of the pronotum, as in Figs 191, 194	***Glomeremus pileatus***

Species accounts

Suborder Caelifera
Acridoidea
Acrididae
Acridinae
Truxalini

Oxytruxalis ensis (Burr, 1899)

Figs 16–18

References for Socotra. Burr 1899b: 43–44 [as *Truxalis ensis*]; Burr 1902: 161–162 [as *Acrida ensis*]; Burr 1903: 412, 413, 416, plate XXV: figs 4, 4a [as *Truxalis ensis*]; Krauss 1907: 29 [as *Acrida ensis*]; Dirsh 1950: 149–151, figs 50, 51; Popov (in Uvarov and Popov (1957)): 384–385; Wranik 2003: 325, plates 153, 158.

Diagnostic notes. *Oxytruxalis ensis* is a very slender and elongated species (Figs 16, 17). It differs from *Truxalis viridifasciata* (Fig. 19) in very long antennae that exceed the combined length of the head and pronotum, an almost flat and strongly elongated pronotum parallel in the prozona, very long tegmina that are gradually narrowed and pointed in the apical half and hind wings that are much shorter than the tegmina (Figs 16, 17) (Burr (1899b, 1902, 1903). The inner upper lateral lobe of the hind knee is

Figure 16. *Oxytruxalis ensis* (Burr, 1899), male. The only known male specimen collected by Kenneth Guichard at Wadi Dineghen in April 1967. Scale bar: 1 cm (photograph Rob Felix).

elongated and longer than the outer upper lobe (Fig. 17B) (Dirsh 1950; Popov in Uvarov and Popov (1957)).

Taxonomic notes. Burr (1899b, 1903) described the species, based on two female syntypes (Fig. 17). Dirsh (1950) gave a re-description of the genus and species. The male of *O. ensis* has never been described. A short description of the male is provided here, together with a photo of the only known adult male specimen (Fig. 16).

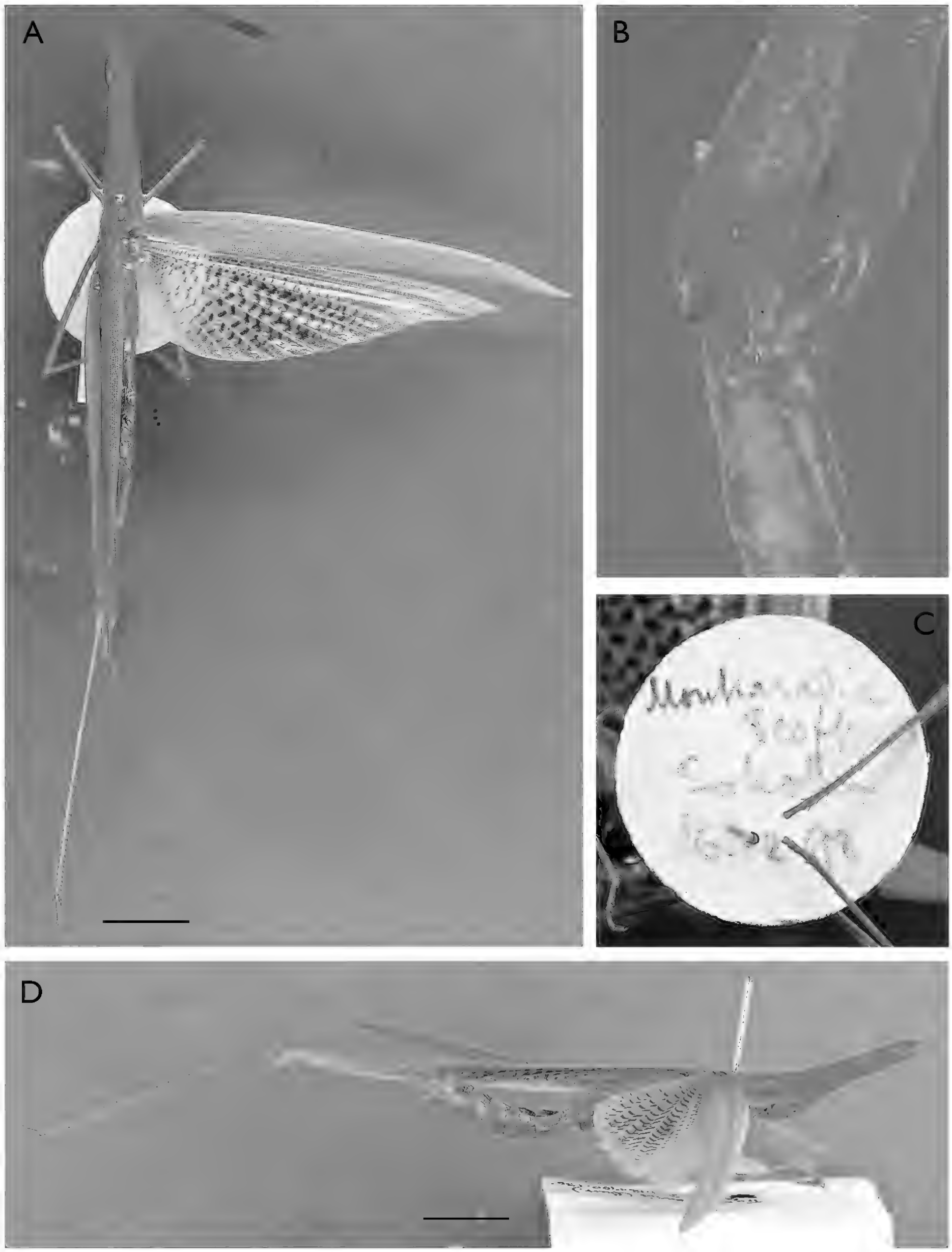

Figure 17. *Oxytruxalis ensis* (Burr, 1899), female, holotype. **A, D.** Habitus; **B.** Left hind knee with elongated inner upper lobe; **C.** Label. Collected by Forbes & Ogilvie-Grant at Moukaradia Pass, Rooget Hill, Socotra in 1898. Scale bar: 1 cm (photograph T. Hunter, WML, Liverpool).

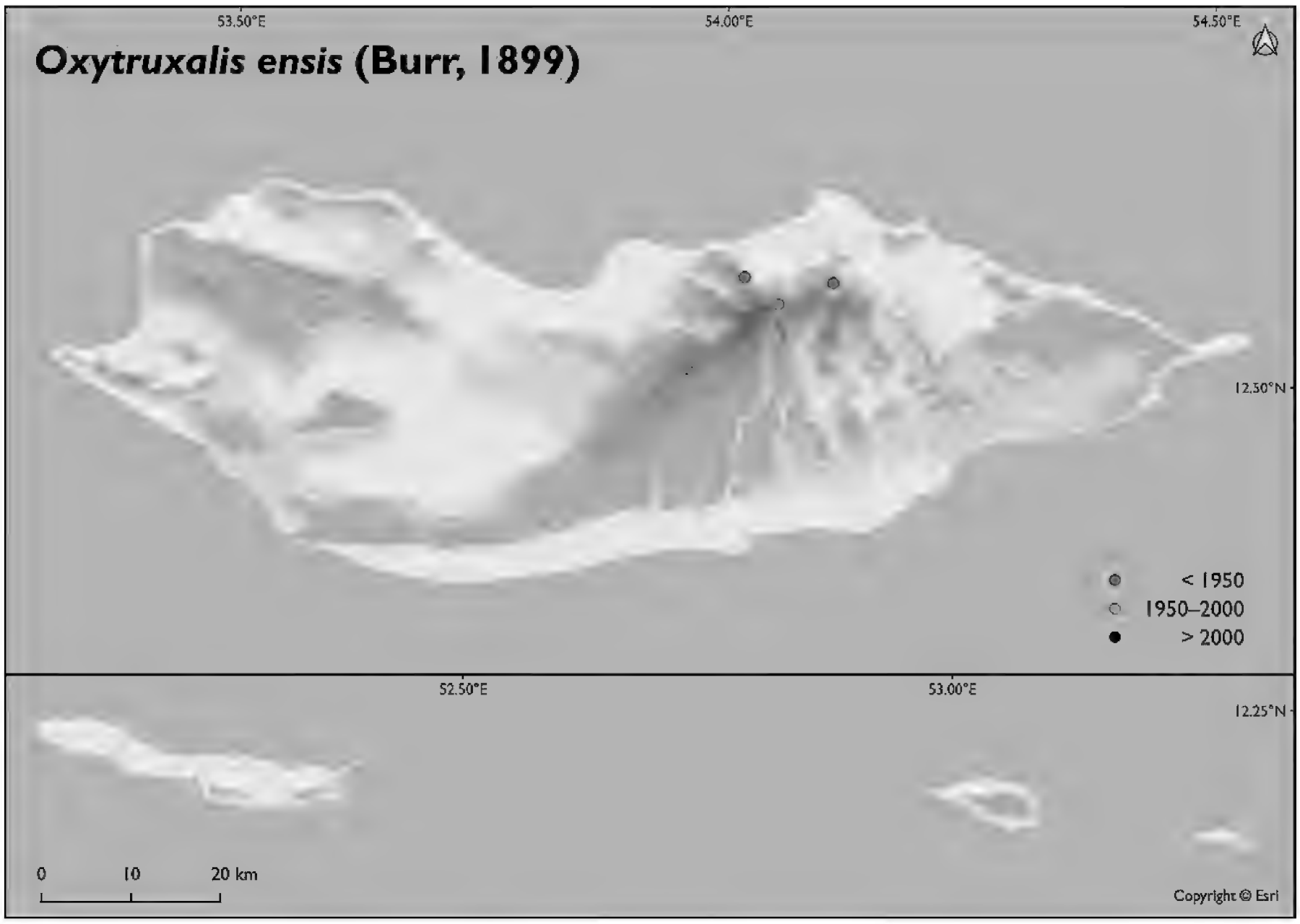

Figure 18. Distribution of *Oxytruxalis ensis* (Burr, 1899) in the Socotra Archipelago.

Description of the male. Smaller than the female; body length: 39 mm; frons 10 mm; antenna length: 18 mm; tegmen length: 26 mm; hind wing length: 23 mm. The apex of the fastigium tapers more sharply and is less rounded than in the female. The hind wing is relatively longer than in the female: it is only 12% shorter than the tegmen; in females, this is 20% (Figs 16, 17A) (Dirsh 1950). The pronotum is malformed, making it indescribable in detail. The subgenital plate is short and conical with a sharp apex. The general colouration is yellowish-green. The tegmina have longitudinal reddish, brownish and white lines. The basal disc of the hind wing is reddish with a tessellate pattern (Fig. 16). Other characteristics are the same as in the female (see Dirsh (1950)).

Distribution and occurrence. *Oxytruxalis ensis* is endemic to Socotra and a very scarce species. It is only known from one adult male, two adult females and a nymph found in the mid-elevations in the Hagher massif and on the surrounding limestone plateau (Fig. 18). There are no records after 1967.

Habitat and biology. The habitat is unknown. Based on its distribution, the species probably inhabits herbaceous or grassy sites in wood- and shrubland at 250–950 m a.s.l. All known localities, Moukaradia Pass, Wadi Dineghen and Jena-agahan, are in Frankincense woodland. Records are from January, March (a nymph), April and December.

Bioacoustics. It is unknown if this species emits a calling song. Members of Truxalini are known to possess a stridulatory apparatus and can produce sounds through crepitation by snapping their hind wings during flight (Harz 1975; Haggag and Badawy 2017).

Truxalis viridifasciata (Krauss, 1902)

Figs 19, 20

References for Socotra. Burr 1898: 384 [as *Tryxalis nasuta*]; Krauss 1902: 4 [as *Acrida* (*Acridella*) *viridifasciata*]; Burr 1903: 412, 416 [as *Truxalis nasuta*]; Krauss 1907: 18, 29, plate II: figs 1, 1A [as *Acrida viridifasciata*]; Dirsh 1950: 196–199, figs 125, 126; Popov (in Uvarov and Popov (1957)): 383, figs 37, 38; Wranik 1998: 158, 171; Wranik 2003: 325, plates 153, 158.

Diagnostic notes. *Truxalis viridifasciata* can be distinguished from *Oxytruxalis ensis* by the following characteristics: antennae shorter than head and pronotum combined; pronotum saddle-shaped; tegmina more abruptly narrowed and obtusely pointed apically; hind wings only somewhat shorter than the tegmina; both the upper lateral lobes (inner and outer) of the hind knees of more or less the same length. Only adults of *Oxytruxalis* and *Truxalis* can be separated, based on the above characteristics. Nymphs are much harder to identify since their wings and the shape of the pronotum have not yet fully developed.

We identified the nymph specimens in our collection and those collected by Wranik as *T. viridifasciata*, based on the equal length of the inner and outer dorsal spurs on the hind knees. A nymph mentioned by Burr (1898) under *Truxalis nasuta* (Linnaeus, 1758) is also considered

to belong to this species (Krauss 1907; Popov in Uvarov and Popov 1957).

Distribution and occurrence. The species is endemic to Socotra. It is relatively widespread in the Hagher, the surrounding limestone plateaus and the lower plains, but is uncommon (Fig. 20).

Habitat and biology. The species occurs in various habitats between 35 and 1000 m a.s.l. Most records are from sparse dwarf, *Croton-Jatropha-* and submontane shrubland, submontane grassland and open woodland. Both adults and nymphs are present in all seasons.

Bioacoustics. This species supposedly produces a song. Members of Truxalini are known to possess a stridulatory apparatus and can produce sounds through crepitation by snapping their hindwings during flight (Harz 1975; Haggag and Badawy 2017).

Figure 19. *Truxalis viridifasciata* (Krauss, 1902), female, holotype. Collected by Oscar Simony in 1899. Scale bar: 1 cm (photograph Harald Bruckner, NOaS Image Collection, Natural History Museum Vienna).

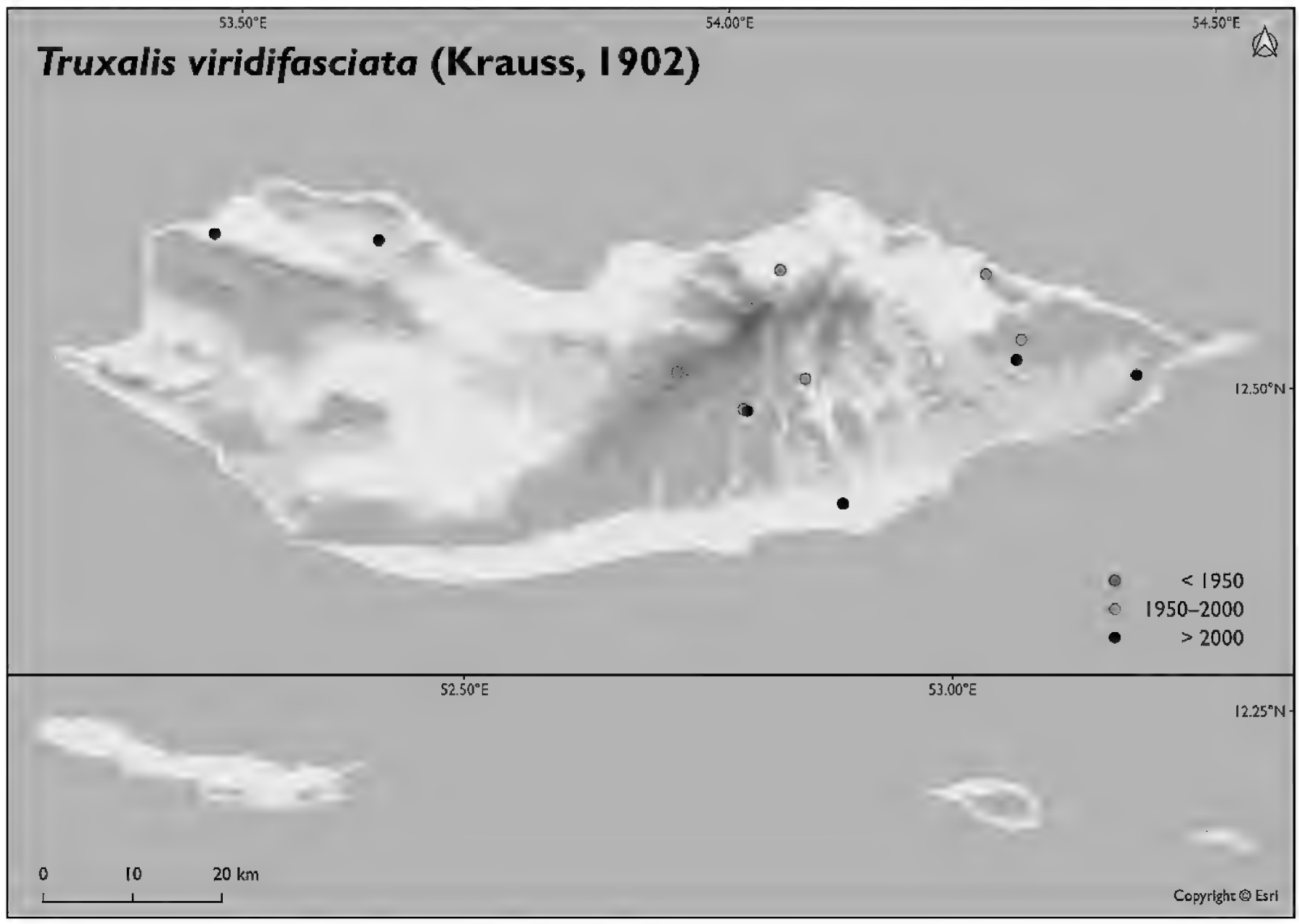

Figure 20. Distribution of *Truxalis viridifasciata* (Krauss, 1902) in the Socotra Archipelago.

Calliptaminae

Acorypha bimaculata (Krauss, 1902)

Figs 21, 22

References for Socotra. Krauss 1902: 4–5 [as *Calliptamus bimaculatus*]; Krauss 1907: 24, 29 [as *C. bimaculatus*]; Popov (in Uvarov and Popov (1957)): 372–373 [as *Caloptenopsis bimaculatus*]; Jago 1967: 416, 441–442, fig. 14; Wranik 1998: 171; Wranik 2003: 321, plates 151, 155.

Diagnostic notes. *Acorypha bimaculata* and the following species, *A. glaucopsis*, have pinkish-based hind wings. *A. bimaculata* is distinguished from the latter by the following characteristics: the inner side of the hind femora is solid black, the hind femora are more slender with a length-to-height ratio greater than 2.8 and the ventral femoral carina is lower than the dorsal one.

Taxonomic notes. *Acorypha bimaculata* is an outlier within the genus because of its slender appearance, the unique shape of the pronotal lateral carinae and its long wings (Fig. 21). Jago (1967) considered it most closely related to *A. ornatipes* Uvarov, 1950 from nearby mainland Africa (Somalia, Ethiopia, Kenya and Tanzania).

Distribution and occurrence. *Acorypha bimaculata* is endemic to the Socotra Archipelago and occurs on Socotra and Samha. It is a widespread and common species in the Hagher and limestone plateaus. The type locality of *A. bimaculata* is Ras Shuab. Since the cape (Ras) is an unreachable site because of pure rock and surf, we consider the collecting site to be the coastal area of Shuab instead, north of the cape (Fig. 22).

Habitat and biology. *A. bimaculata* is a geophilous species found year-round on rocky soils from sea level up to 1000 m a.s.l. On sandy soils, it is much scarcer. Records are from high shrubland with succulents, submontane grasslands, Frankincense woodland and forest and montane mosaic and -forest. It inhabits more wooded habitats compared to *A. glaucopsis* (Popov in Uvarov and Popov (1957)).

Figure 21. *Acorypha bimaculata* (Krauss, 1902), male. Delisha, Socotra, 30 Jan 2024 (photograph James Bailey).

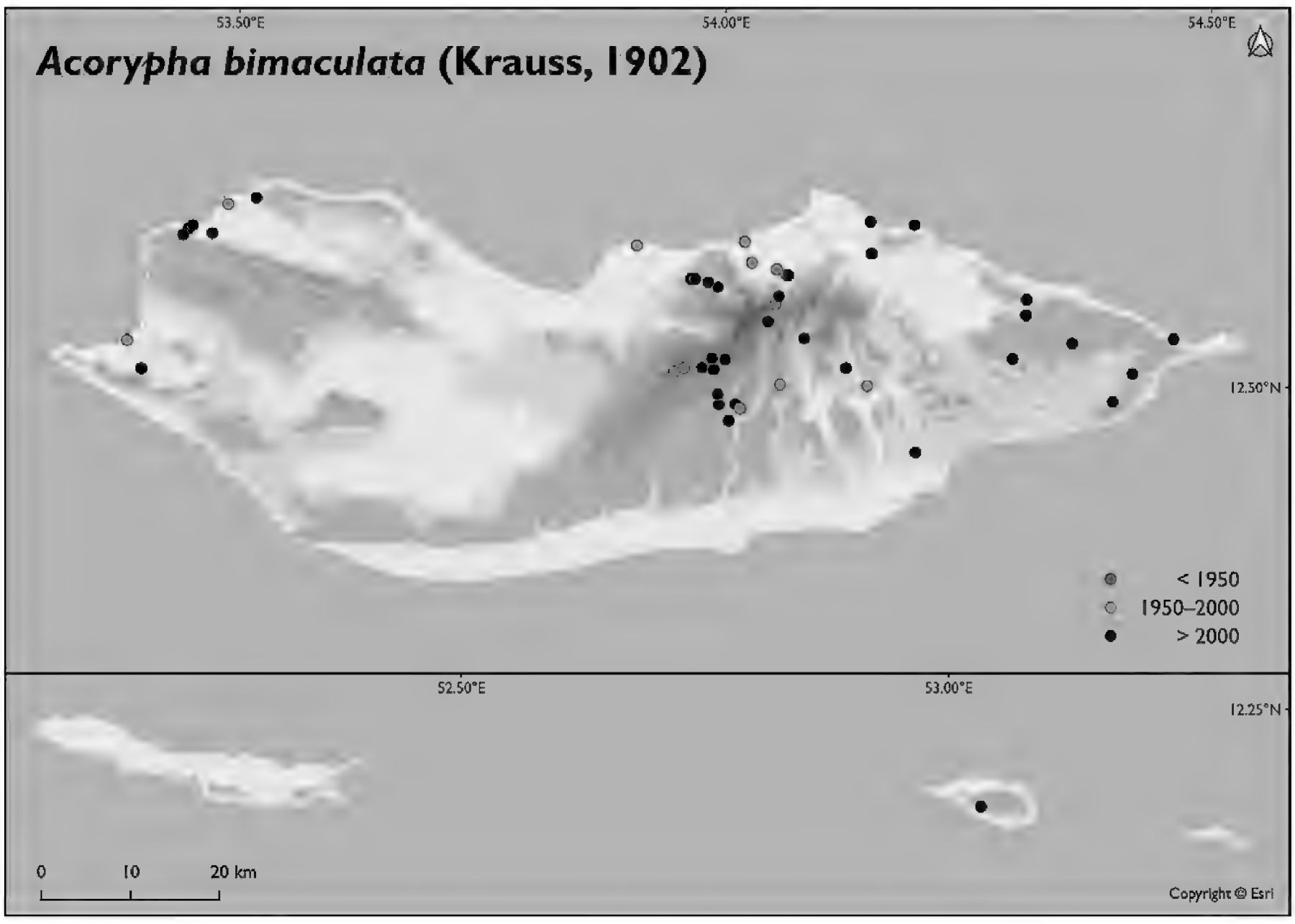

Figure 22. Distribution of *Acorypha bimaculata* (Krauss, 1902) in the Socotra Archipelago.

Figure 23. *Acorypha glaucopsis* (Walker, 1870), male. Momi, Socotra, 2 Nov 2010 (photograph Robert Ketelaar).

Acorypha glaucopsis (Walker, 1870)

Figs 23, 24

References for Socotra. Krauss (1902): 5 [as *Calliptamus pachypus*]; Burr (1903): 412, 420 [as *Caloptenus italicus*]; Krauss (1907): 24–25, 29 [as *Calliptamus pachypus*]; Uvarov (1950): 387, 393 [as *Caloptenopsis pachypus*]; Popov (in Uvarov and Popov (1957)): 372 [as *Caloptenopsis glaucopsis orientalis*]; Jago (1967): 416, 426, 429–430, figs 14, 123; Wranik (1998): 171; Wranik (2003): 321, plates 151, 155.

Diagnostic notes. *Acorypha glaucopsis* can be distinguished from *A. bimaculata* by the following characteristics: the inner side of the hind femora is yellow; the hind femora are broader, with a length-to-height ratio of less than 2.8. The femoral carinae are high; the dorsal and ventral ones are more or less the same height, with the ventral one being clearly whitish (Fig. 23).

Taxonomic notes. Specimens from Socotra were formerly described by Krauss (1902) as *Calliptamus pachypus* Krauss, 1902. Uvarov (in Uvarov and Popov (1957)) synonymised the species with *Caloptenopsis glaucopsis orientalis*, which, in turn, was synonymised with the nominate by Jago (1967), who also synonymised *Caloptenopsis* with *Acorypha*.

Distribution and occurrence. It has a wide distribution from Sahelian West Africa, Uganda, Tanzania, Ethiopia and Somalia, as well as Arabia and India (Rowell and Hemp 2017). On Socotra, the species is widespread and locally very common on coastal plains, like Hadiboh Plain. It is much scarcer at higher elevations (Fig. 24).

Habitat and biology. *Acorypha glaucopsis* is a typical geophilous species characteristic of gravelly, stony, sandy plains with sparse vegetation. Most records are from sparse dwarf, low *Croton-Jatropha* shrubland and submontane grassland from 0–800 m a.s.l. Records are of all seasons.

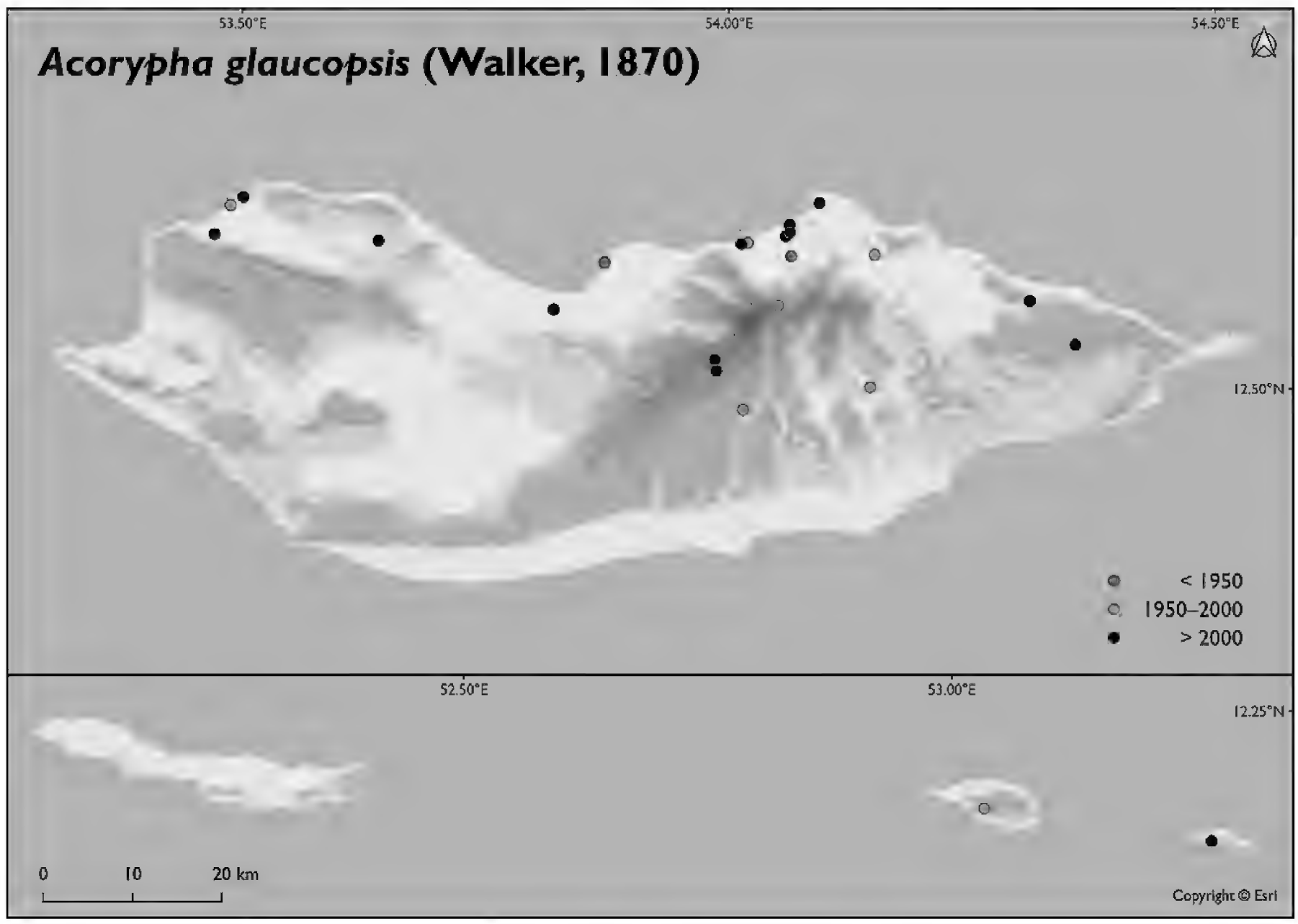

Figure 24. Distribution of *Acorypha glaucopsis* (Walker, 1870) in the Socotra Archipelago.

Catantopinae

Diabolocatantops axillaris (Thunberg, 1815)

Figs 25, 26

References for Socotra. Krauss (1902): 4 [as *Catantops versicolor*]; Burr (1903): 412, 420 [as *Oxya vicina*]; Krauss (1907): 17, 23, 29, plate II, fig. 6 [as *Catantops versicolor*]; Popov (in Uvarov and Popov (1957)): 371 [as *Catantops axillaris*]; Wranik (1998): 171; Wranik (2003): 321, plates 151, 155.

Diagnostic notes. *Diabolocatantops axillaris* is a medium-sized grasshopper, uniformly coloured light brown or grey, with dark brown sides of the pronotum and long tegmina. An oblique vertical whitish line on the posterior margin of the metathorax is characteristic. The hind femora are uniformly grey-brown, except for a black knee, two dorsal dark transverse bands and an isolated black marking on the dorsal edge of the median external area (Fig. 25).

Taxonomic notes. *Diabolocatantops* Jago, 1984 is a mainly Asian genus, defined by the male genitalia and shape of the cerci (Jago 1984; Rowell and Hemp 2018). *D. axillaris* is the only species that occurs outside Asia in Africa.

Distribution and occurrence. It occurs across the dry savannah belt south of the Sahara, in the Arabian Peninsula, Iran and several Indian Ocean islands, including Socotra, where it is widespread and ubiquitous at low elevations (Fig. 26). It is one of the most common insects on the island (Popov in Uvarov and Popov (1957)). In 2009 and 2010, we encountered hundreds of individuals on many lowland sites.

Figure 25. *Diabolocatantops axillaris* (Thunberg, 1815), female. Hadiboh, Socotra, 30 Oct 2010 (photograph Robert Ketelaar).

Habitat and biology. *D. axillaris* is found in various habitats on Socotra, but always occurs in the direct vicinity of vegetation. The species is numerous at low elevations, less so higher up in the Hagher. Records are from year-round, from 0–800 m a.s.l. Specimens overnight in shrubs like *Senna socotrana*. Records are from sparse dwarf and low *Croton-Jatropha* shrubland and submontane grassland, less from higher shrubland, woodland and forest.

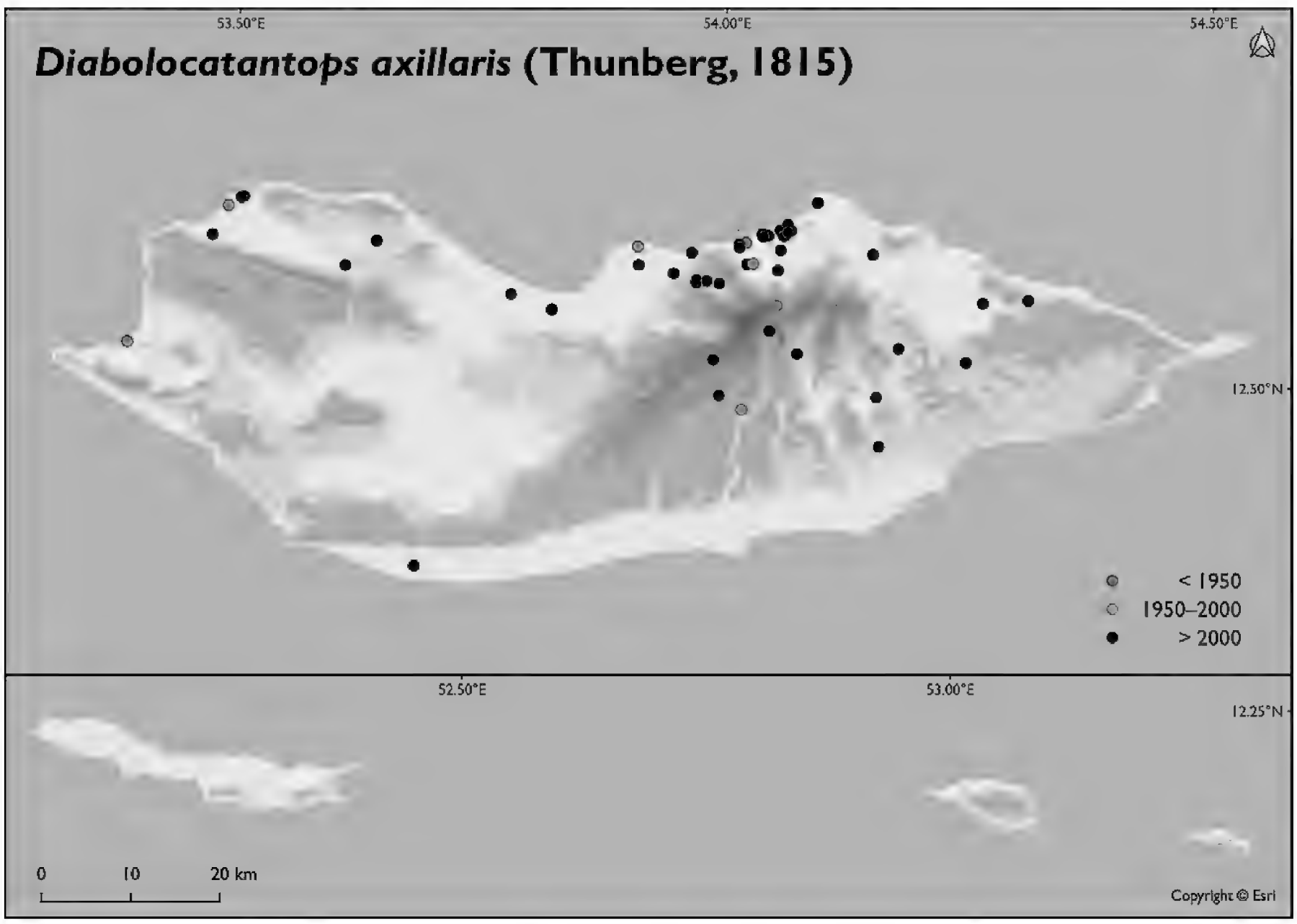

Figure 26. Distribution of *Diabolocatantops axillaris* (Thunberg, 1815) in the Socotra Archipelago.

Figure 27. *Dioscoridus depressus* Popov, 1957, female. Dineghen, Socotra, 494 m a.s.l., 1 Nov 2010 (photograph Robert Ketelaar).

Dioscoridus depressus Popov, 1957

Figs 27–29

References for Socotra. Popov (in Uvarov and Popov (1957)): 373–374, fig. 23; Guichard 1992: 185; Wranik 2003: 321, plates 153, 155.

Diagnostic notes. *Dioscoridus depressus* is readily identifiable by several distinct characteristics: it is entirely apterous, with a conspicuous yellowish to light brown central longitudinal line from the fastigium to the tip of the abdomen. Two irregularly swollen ridges on the pronotum's sides represent the lateral carinae. It features a well-defined, large tympanum (Figs 27, 28).

Taxonomic notes. The genus is named after Dioscorida, the name of Socotra in Sanskrit, meaning the island of the abode of bliss (Schoff 1912). Popov (in Uvarov and Popov (1957)) stated that the genus stands alone within the Catantopinae, without an apparent near relative, apart from some superficially resembling African bush-dwelling genera.

Distribution and occurrence. *Dioscoridus* is endemic to Socotra. Records are mainly from the Hagher and the surrounding limestone plateaus, but singletons in the west at Shuab suggest a much wider distribution (Fig. 29). It is considered uncommon, but may be easily overlooked due to its partially hidden way of life.

The labels of the specimens collected by Guichard on Mt. Shihali mention an elevation of 1500 m a.s.l. Since the peak of this mountain reaches 1324 m a.s.l., this is a mistake. Furthermore, Guichard's field notes (1967) show he visited "the mountain's lower slopes" on 20 April 1967, not the mountain's peak. Based on this information and our knowledge of the area, we estimate the collecting site of these specimens to be more or less around 1100 m a.s.l. in an area much closer to Adho Dimello.

Habitat and biology. Records of *Dioscoridus* are from high shrubland with succulents, submontane shrubland, *Dracaena* woodland and forest, montane mosaic and forest. Adults and nymphs live under and in cracks of the bark of dead trees, under stones and on open ground (Popov in Uvarov and Popov (1957)). Guichard (1992) found several adults under the bark of dead trees, side by side with geckoes. The species is present year-round; nymphs were found in February, March and October. Records are from 10–1100 m a.s.l.

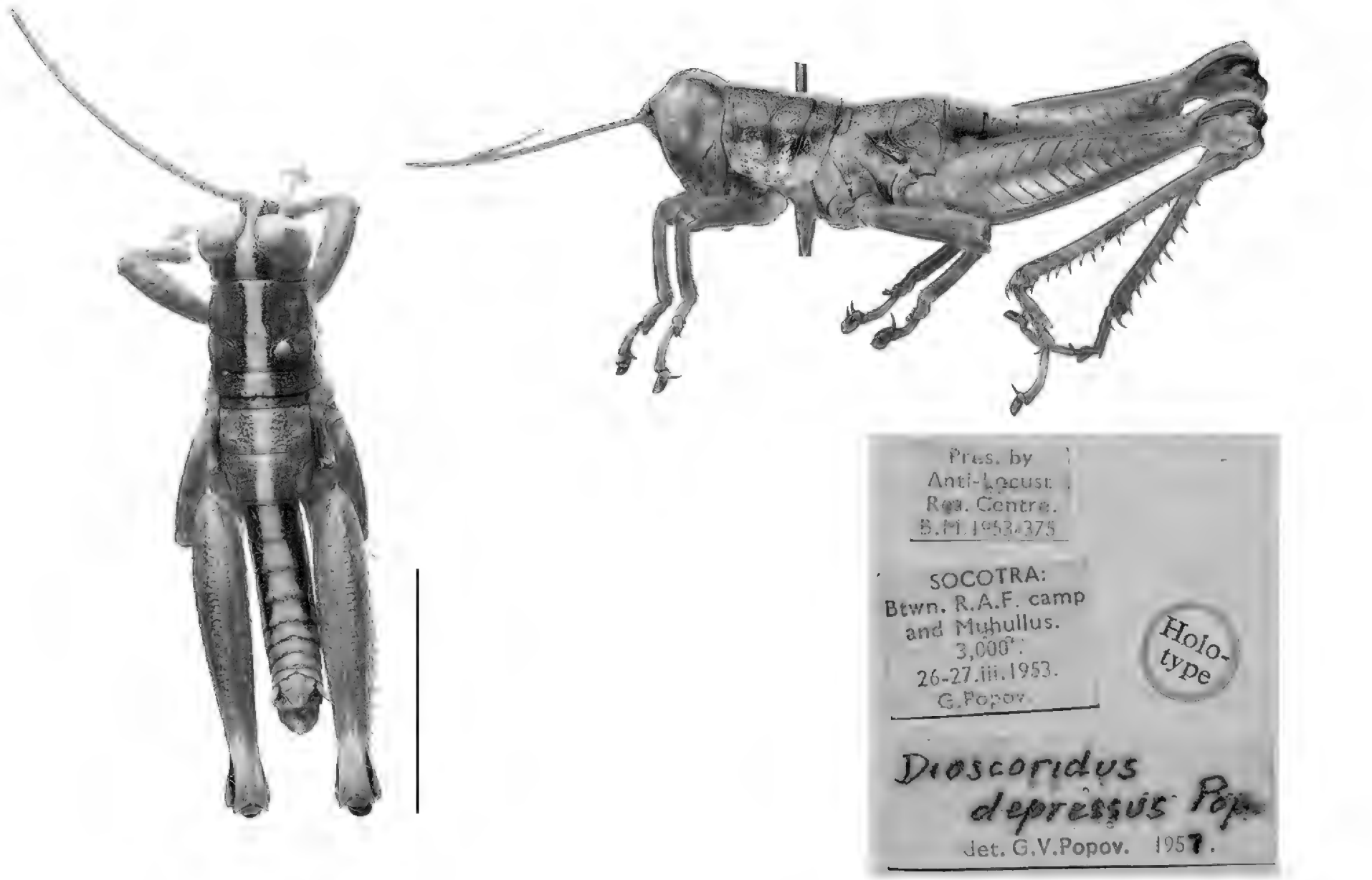

Figure 28. *Dioscoridus depressus* Popov, 1957, male, holotype. Dixam Plateau in 1953. Scale bar: 1 cm (photograph Rob Felix).

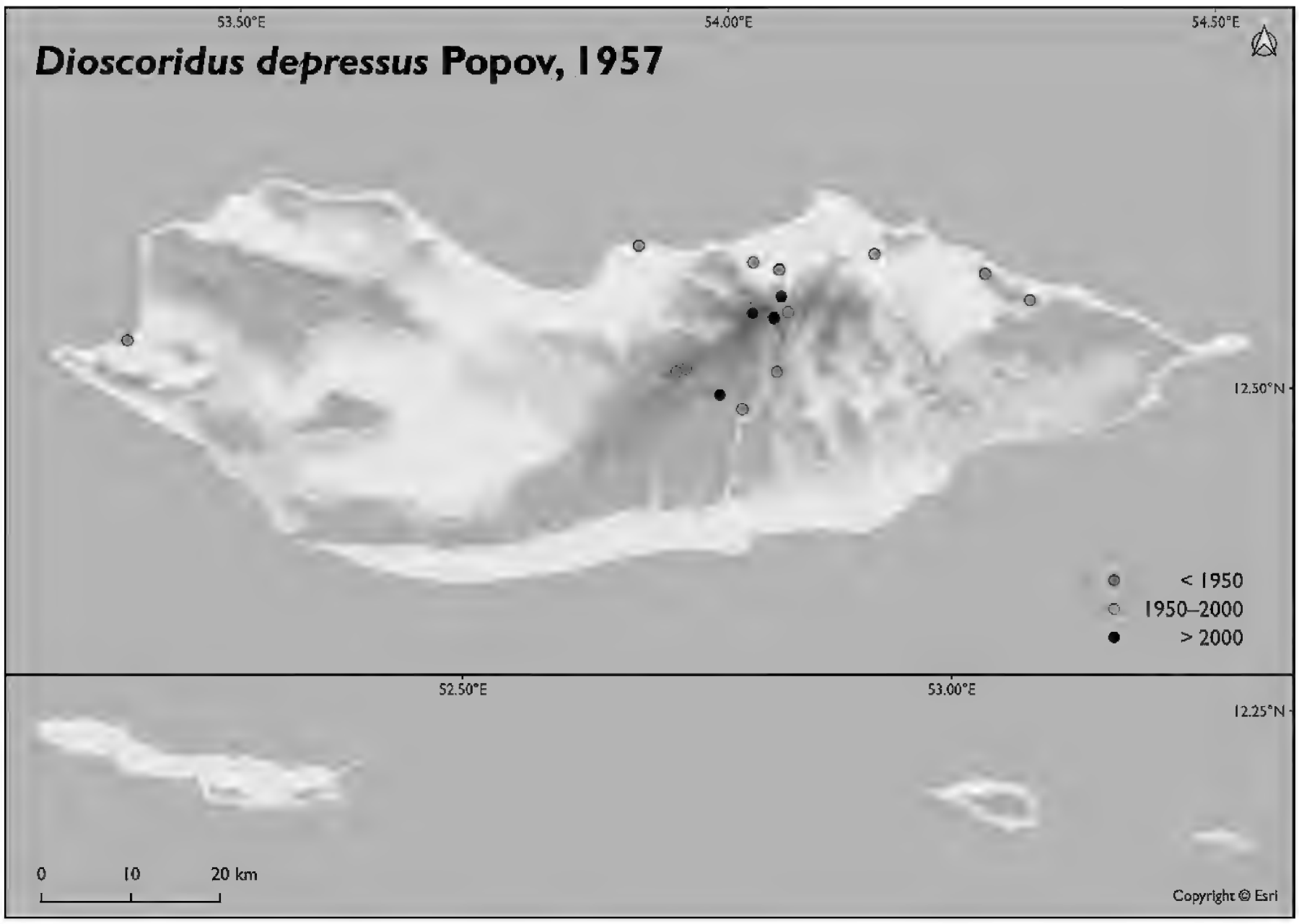

Figure 29. Distribution of *Dioscoridus depressus* Popov, 1957 in the Socotra Archipelago.

Cyrtacanthacridinae

Anacridium melanorhodon arabafrum Dirsh & Uvarov, 1953

Fig. 30

References for Socotra. Taschenberg 1883: 185 [as *Acridium tataricum* var. *moestum*]; Burr 1903: 412, 421 [as *Acridium tataricum* var. *moestum*]; Krauss 1907: 29 [as *Acridium moestum*]; Dirsh and Uvarov 1953: 23–24; Popov (in Uvarov and Popov (1957)): 375; Popov and Ratcliffe 1968: 24; Wranik 1998: 171; Wranik 2003: 322, plates 152, 156.

Diagnostic notes. Grasshoppers of the genus *Anacridium* Uvarov, 1923 are huge. The pronotum is roof-like with a distinct median carina, incised by three transverse sulci. A pinkish or orange line runs mid-dorsally over the head and pronotum. The hind wings have a dark wing disc and the hind tibiae are adorned with robust spines. The male subgenital plate is deeply trilobate with obtuse lobes. *A. m. arabafrum* is the only member of the genus in the Archipelago and the largest grasshopper species present.

Taxonomic notes. *Anacridium* is a predominantly African genus with thirteen species (Cigliano et al. 2024a), which are identified by the trilobate subgenital plate, the extent of the dark hind-wing disc and the shape of the sulci in the median carina of the pronotum (Dirsh and Uvarov 1953). *A. melanorhodon* (Walker, 1870) has two subspecies, of which the nominate occurs in the western and *A. m. arabafrum* in the eastern part of its distribution.

Distribution and occurrence. *Anacridium m. arabafrum* occurs from Ethiopia and Sudan eastwards into Yemen and Saudi Arabia. On Socotra, it appears to be relatively scarce, with only a handful of widespread records at lower elevations (Fig. 30). Burr (1898, 1903) mentioned nymphs of *Acridium* sp., which may refer to this species.

Habitat and biology. *Anacridium* are known as "tree locusts" and feed on trees, especially *Acacia*, *Balanites* and *Zizyphus*. They sometimes damage fruit trees (e.g. dates, citrus) and other woody plant crops (Lecoq and Zhang 2019; Hemp and Rowell 2020). Records on Socotra are from sparse dwarf and low *Croton-Jatropha* shrubland from 25–400 m a.s.l., nearly from all seasons.

Cyrtacanthacris tatarica (Linnaeus, 1758)

Fig. 31

References for Socotra. Burr 1903: 412, 421 [as *Acridium tataricum*]; Popov (in Uvarov and Popov (1957)): 376; Wranik 2003: 323, plate 156.

Diagnostic notes. This large grasshopper has an elegant pattern of light and dark brown markings. The head and pronotum feature a mid-dorsal whitish longitudinal line extending on to the folded tegmina. The prosternal process is strongly curved backwards. The pronotum is moderately roof-like, slightly saddle-shaped, dark brown and thinly margined white. There are tiny white spots and a broad rectangular light bar on the lateral lobes. The

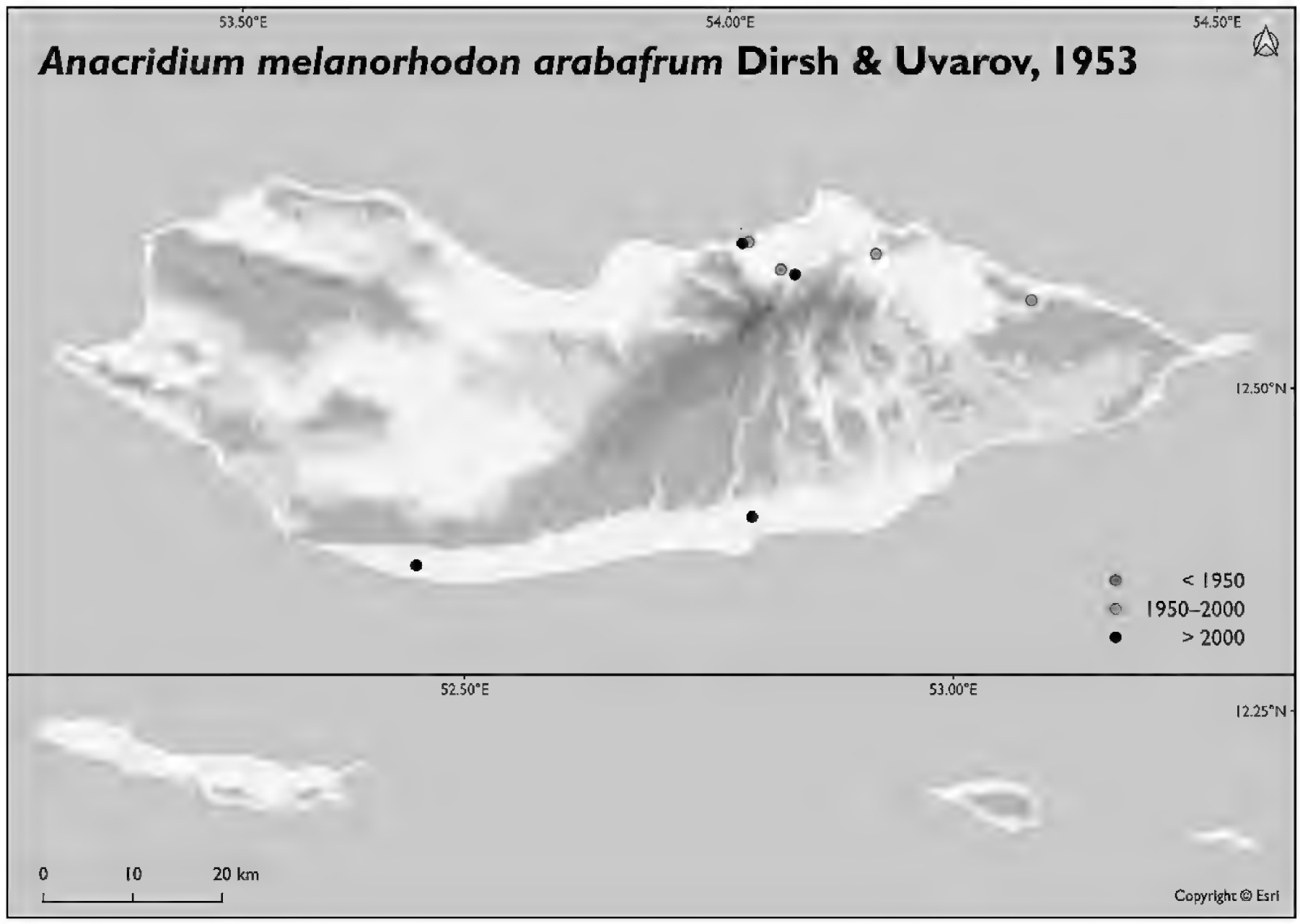

Figure 30. Distribution of *Anacridium melanorhodon arabafrum* Dirsh & Uvarov, 1953 in the Socotra Archipelago.

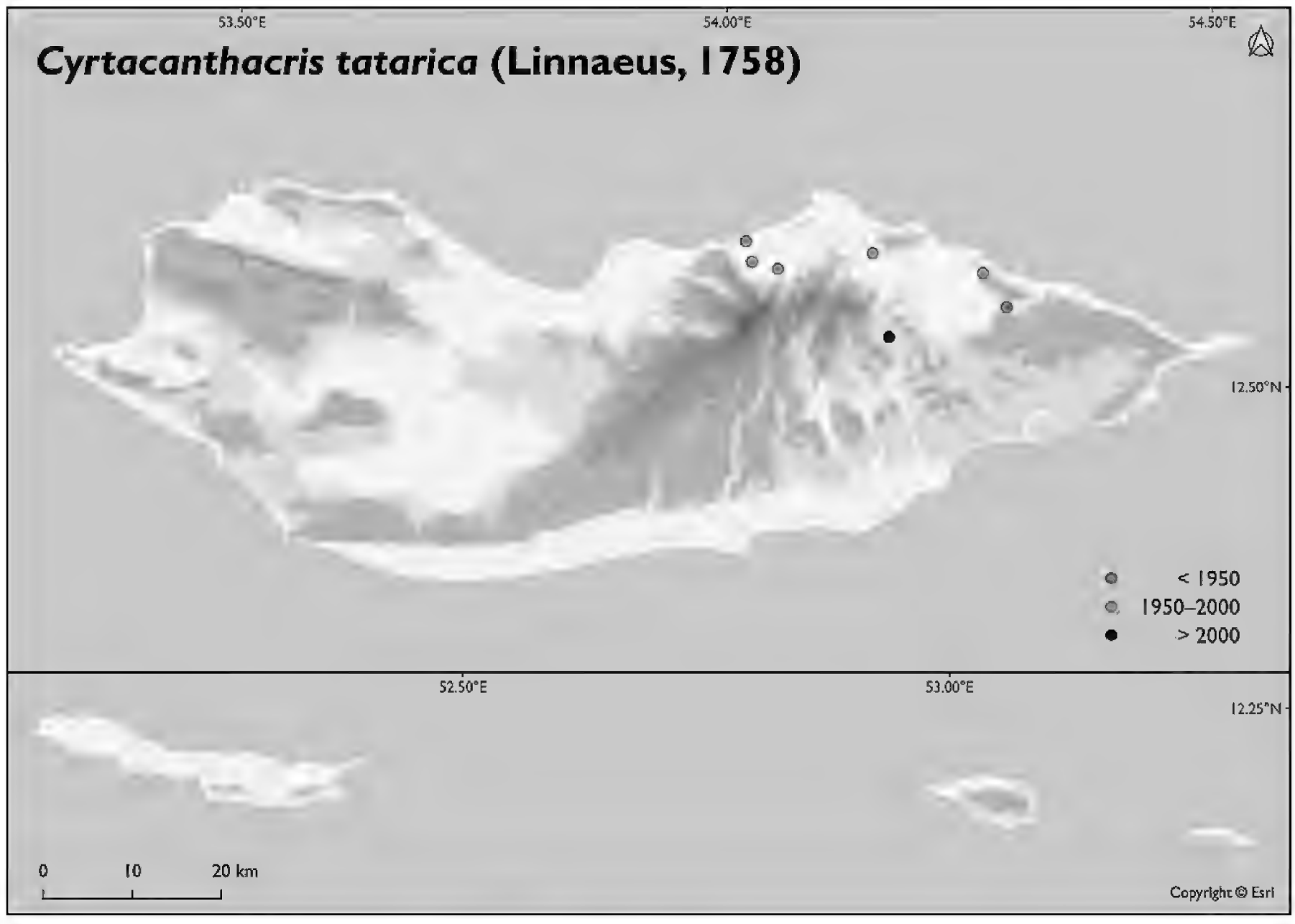

Figure 31. Distribution of *Cyrtacanthacris tatarica* (Linnaeus, 1758) in the Socotra Archipelago.

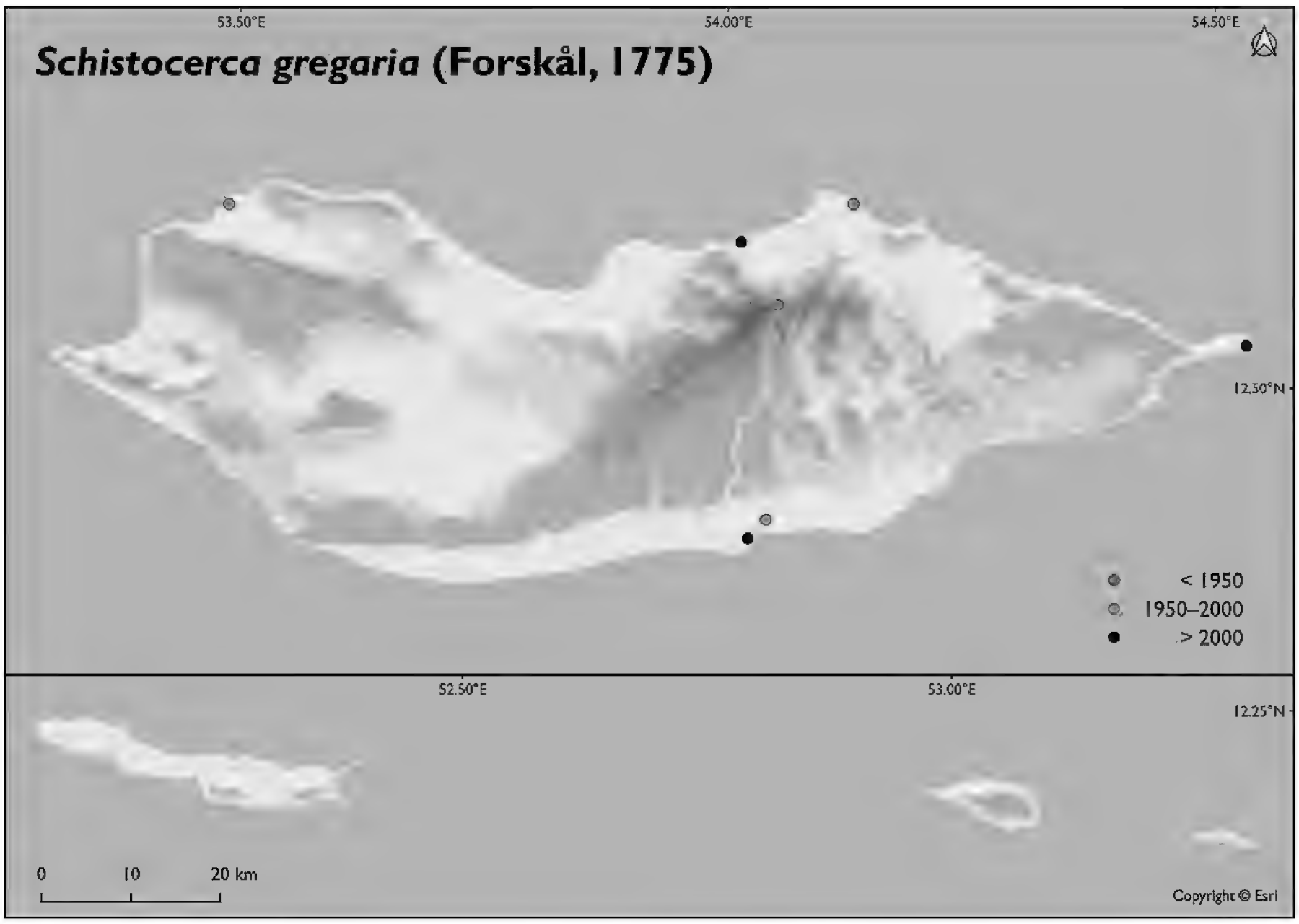

Figure 32. Distribution of *Schistocerca gregaria* (Forskål, 1775) in the Socotra Archipelago.

tegmina have sharply defined dark fasciae and spots and the hind wings are pale yellowish at the base. The median external area of the hind femora bears a thin longitudinal blackish line on the dorsolateral edge. The subgenital plate is elongated and acutely conical. *Cyrtacanthacris* Walker, 1870 is an Asian and African genus containing seven species (Cigliano et al. 2024a), differing from each other by the male phallic complex (Dirsh 1979).

Distribution and occurrence. *Cyrtacanthacris tatarica* occurs in Africa south of the Sahara and is common in Madagascar and the Seychelles, SW Asia, S Asia to Sumatra and the Philippines (Hemp and Rowell 2020). On Socotra, it is relatively scarce, with some scattered older records in the eastern part of the island. We did not find the species in 2009 and 2010. Records are from January to May (Fig. 31).

Habitat and biology. The species typically occurs in savannah grasslands (Hemp and Rowell 2020). Records on Socotra are from sparse dwarf and low *Croton-Jatropha* shrubland at elevations from 25–400 m a.s.l.

Schistocerca gregaria (Forskål, 1775)

Figs 32, 33

References for Socotra. Popov (in Uvarov and Popov (1957)): 375; Popov 1959: 89–95; Wranik 1998: 161; Wranik 2003: 322, plates 152, 156.

Diagnostic notes. This large, fully-winged grasshopper is light brown and subtly patterned with minor dark spots. The pronotum is saddle-shaped and constricted

Figure 33. *Schistocerca gregaria* (Forskål, 1775). Erisseyl, Socotra, 3 Nov 2010 (photograph Robert Ketelaar).

in the prozona. The median external area of the hind femora bears a thin longitudinal blackish line in the centre (Fig. 32). The subgenital plate is deeply bilobate.

Taxonomic notes. *Schistocerca* Stål, 1873 is a species-rich genus from the Americas with a single ancestor from the Old World, *Schistocerca gregaria* (Song et al. 2017; Hemp and Rowell 2020).

Distribution and occurrence. *Schistocerca gregaria* occurs in Africa and Southwest Asia (Hemp and Rowell 2020), including Socotra (Fig. 32). Both the solitary and swarming phases occur on the island. Records of solitary specimens are relatively scarce. Orthoptera expeditions before 1953 did not record the species (Uvarov and Popov 1957). When Popov worked on the island in 1953, the

species was mainly in the gregarious phase. He recorded only two adults of the solitary phase at Noged, the coastal plane in the south. The Oxford expedition in 1956 collected only one specimen (Popov 1959). Wranik recorded a handful of specimens during his trips (Wranik 1998). In 2009, we only recorded (and collected) one specimen. In 2010, we only did one sight record at Erisseyl (Fig. 33).

Habitat and biology. Popov (1959) reported three swarming events of *Schistocerca* on Socotra: in 1942, in the winter of 1950–51 and in the winter of 1952–53. In the latter, the initial arrival of the swarm and the following egg-laying were expected to have occurred between early December and mid-January. At those times of the year, rains ensure moist conditions suitable for egg-laying. Egg-laying occurred over most parts of the island, mainly on the coastal plains and higher in the Hagher. The first fledging was reported on 20 February and lasted until the first week of March. Few areas of the island were clear of hopper bands, except the dry western parts. After operations to wipe out the heavy infestation, survivors moved high into the Hagher, forming a huge swarm measuring many square miles. After 23 March, the swarm left Socotra, presumably to Somalia (Popov 1959).

The origin of all three known swarming events is expected to be connected to outbreaks in India and Pakistan and the subsequent movement towards the southwest, to southern Iran, the Arabian Peninsula and Somalia. The swarms on Socotra could have crossed from Arabia or even originated directly from India. Although the species occurs on Socotra in the solitary phase, according to Popov (1959), the circumstances on the island seem unfavourable for the development of the swarming phase there itself. It is unclear if this is still the case.

Eyprepocnemidinae

Cataloipus brunneri (Kirby, 1910)

Figs 34, 35

References for Socotra. Burr 1903: 412, 420, plate XXV: figs 2, 2a [*partim*; as *Cataloipus oberthuri*]; Kirby 1910: 557; Uvarov 1921: 140–141 [as *Cataloipus somalicus*]; Popov (in Uvarov and Popov (1957)): 375; Kevan 1967: 88; Wranik 2003: 321, plate 155.

Diagnostic notes. *Cataloipus* Bolívar, 1890 is a genus of medium-sized to large grasshoppers (Fig. 34). The pronotum is dark brown with two broad green longitudinal stripes along the inner side of the obtuse lateral carinae. The lateral lobes of the pronotum are margined whitish and have yellowish spots in the centre. The tegmina are light brown, with small dark spots and a light streak along the anterior margin. The hind femora are large and slender. The male subgenital plate is elongated, shallow and has a notched apex. The prosternal process directs backwards and is slightly flattened with an acute apex.

Cataloipus brunneri is the Archipelago's only member of the genus. It is a relatively small member of the genus. Its hind femora are long and slender and marked with an interrupted black stripe on the dorsal edge of the medio lateral area.

Taxonomic notes. Burr (1903) mentioned six specimens collected by Forbes & Ogilvie-Grant, two from Hadiboh Plain (Fig. 34; present in WML) and four from Homhil (NHMUK). One of Burr's female specimens collected at Homhil later appeared to be *Heteracris coerulescens* (Stål, 1876) (Popov in Uvarov and Popov (1957)).

Kirby (1910) named Burr's specimens from Socotra *Cataloipus brunneri* (Kirby, 1910) without a proper description. According to Popov (in Uvarov and Popov (1957)), the reference to Burr's figures makes the name valid and he regarded Kirby as the author. Thus, all five specimens of *C. brunneri* collected by Forbes & Ogilvie-Grant present in the Liverpool and London collections are syntypes. Uvarov (1921) found no differences between the descriptions of *Eyprepocnemis somalicus* Rehn, 1901 and the types of *C. brunneri*. He examined three specimens of *C. brunneri* in the collection of the NHMUK and synonymised *brunneri* with *somalicus*, the latter tentatively synonymised with *C. oberthuri* Bolívar, 1890 by Kevan (1967), who studied *brunneri*, but could not decide whether it differs from *oberthuri*. Popov (in Uvarov and Popov (1957)) restored the status of *C. brunneri*, emphasising the need for a crucial revision of the genus.

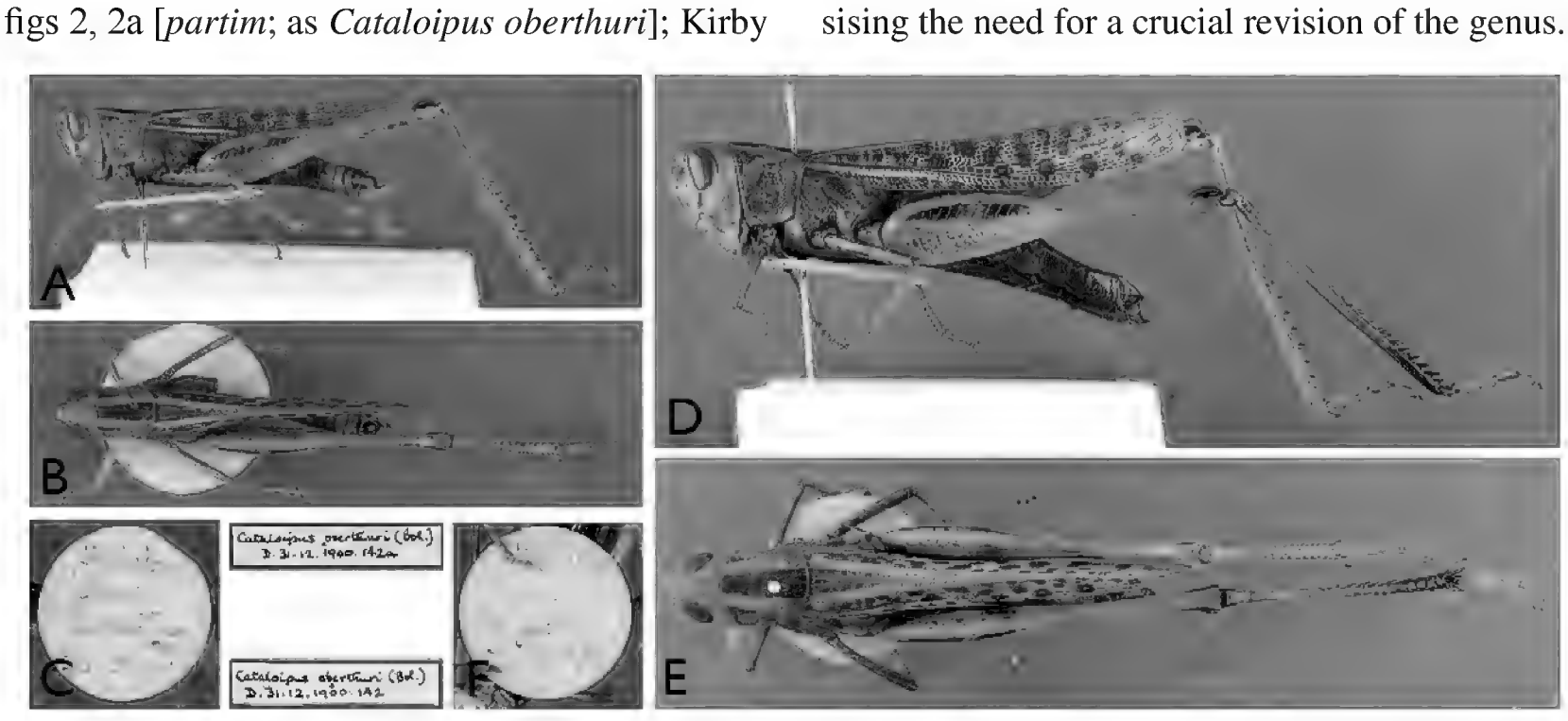

Figure 34. *Cataloipus brunneri* (Kirby, 1910), male, female, syntypes. **A–C.** Male; **D, E.** Female. Habiboh Plain, Socotra, collected by Forbes & Ogilvie-Grant in 1899 (photograph T. Hunter, WML, Liverpool).

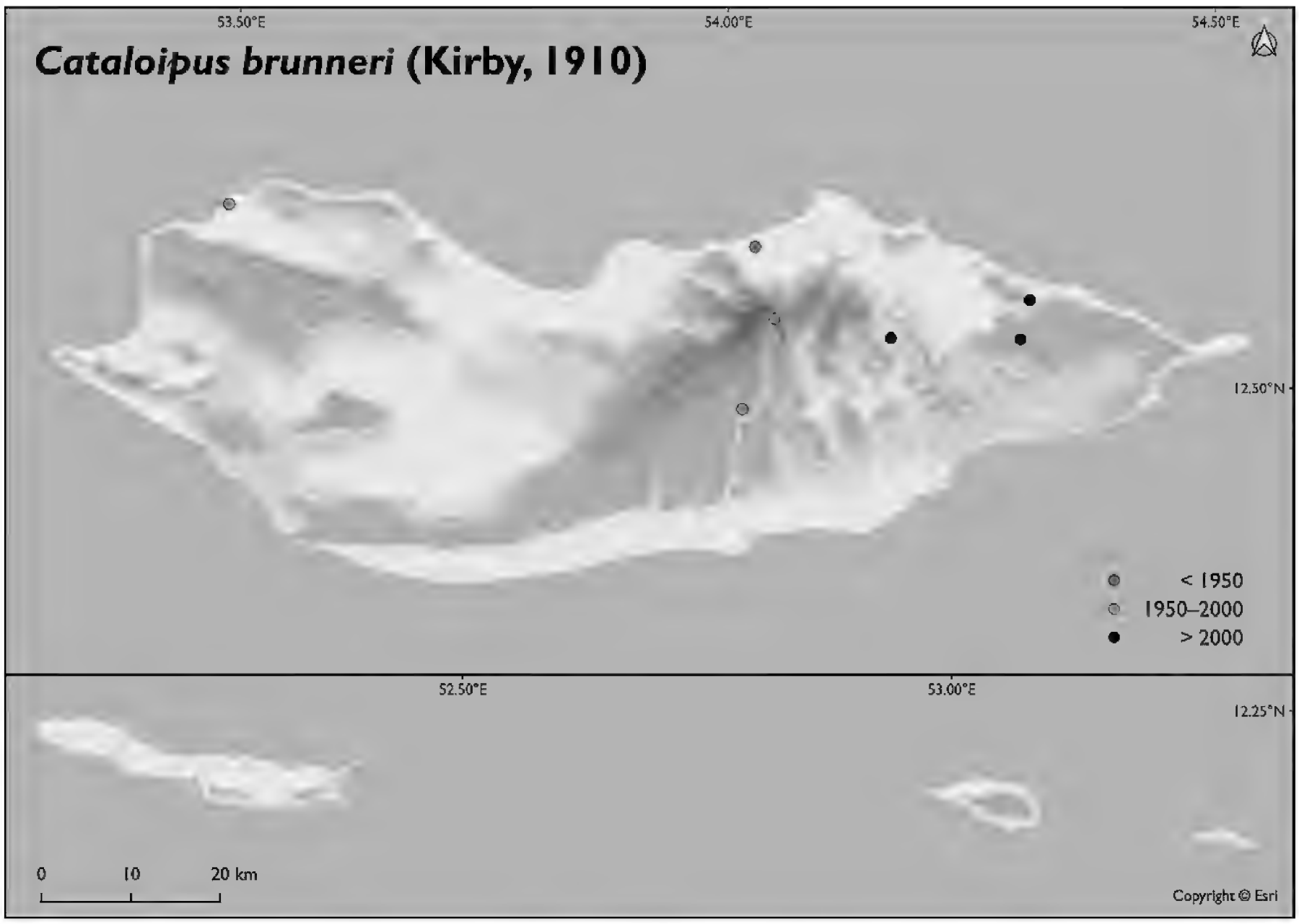

Figure 35. Distribution of *Cataloipus brunneri* (Kirby, 1910) in the Socotra Archipelago.

Distribution and occurrence. *Cataloipus brunneri* is endemic to Socotra. There are few records from the Hagher, the surrounding limestone plateaus and the surroundings of Qalansiyah (Fig. 35). There are no records of the species since 2008.

Habitat and biology. The primary habitat is marsh vegetation along streams at elevations from 10–1000 m a.s.l. According to Popov (in Uvarov and Popov (1957)), it is confined to *Juncus* and sedge marshes along and at the mouths of streams and numerous in its strict habitat, but absent elsewhere. Records are from January to April and August. Popov (in Uvarov and Popov (1957)) encountered "late-instar nymphs and adults in various stages of maturation" in February and March. We visited several suitable *Juncus* vegetations in February 2009 and October–November 2010 (Qalansiyah, Hadiboh Plain, Wadi Zerig, Dineghen/Adho Dimello), but did not encounter this species.

Heteracris adspersa (Redtenbacher, 1889)

Figs 36–38

References for Socotra. Popov (in Uvarov and Popov (1957)): 375 [as *Thisoicetrus* sp.]; Grunshaw 1991: 39; Guichard 1992: 186; Wranik 2003: 322, plate 155; Rowell and Hemp 2017: 178.

Diagnostic notes. Diagnostic for *Heteracris adspersa* within its genus is a rounded subgenital plate with two tubercles in males, a yellow-brown or light green side of the head, a distinctive yellowish stripe behind the eyes

Figure 36. *Heteracris adspersa* (Redtenbacher, 1889), male. In *Arthrocnemum macrostachyum* at Neet, Socotra, 28 Oct 2010 (photograph Rob Felix).

and reddish distal halves of the hind tibiae. Markings on the external side of the hind femora are always rather extensive and reach the middle line (Figs 36, 38).

Distribution and occurrence. *H. adspersa* is distributed along the Atlantic and Mediterranean coasts of North Africa, southern Europe and Arabia east to India (Grunshaw 1991). On Socotra, the species seems to be rare, restricted to Shuab and Neet in the west (Fig. 37).

Habitat and biology. The habitat is strictly coastal, from 0–8 m a.s.l. The species can be abundant in *Arthrocnemum macrostachyum* and *Aerva javanica* at Neet, as observed in 2010. Popov (in Uvarov and Popov (1957)) observed some specimens of unknown identification, but probably

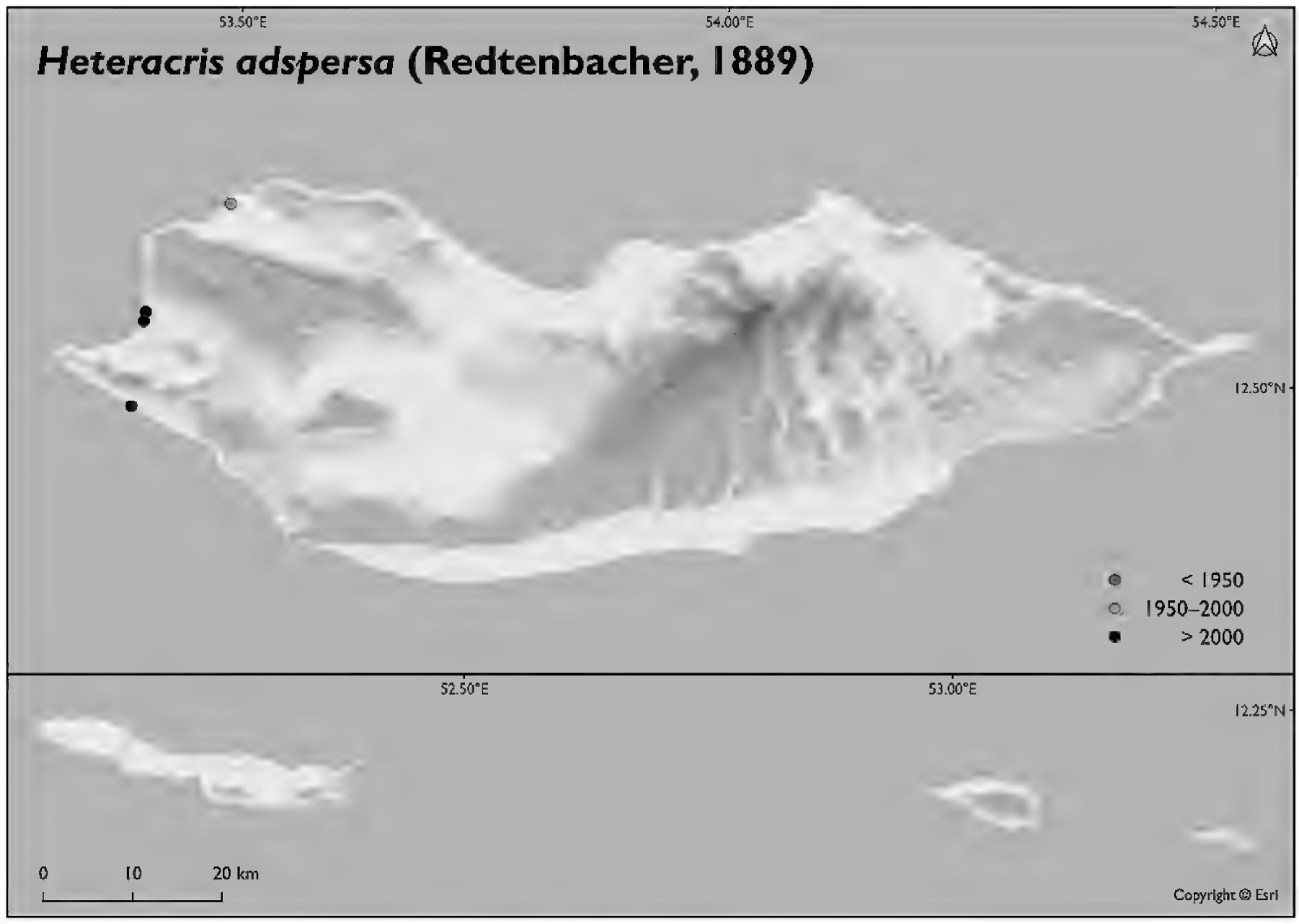

Figure 37. Distribution of *Heteracris adspersa* (Redtenbacher, 1889) in the Socotra Archipelago.

Figure 38. *Heteracris adspersa* (Redtenbacher, 1889), female. In *Arthrocnemum macrostachyum* at Neet, Socotra, 28 Oct 2010 (photograph Robert Ketelaar).

belonging to this species, at the same site (Ghublet Nait). Records are from March, June and October.

Heteracris annulosa Walker, 1870

Fig. 39

References for Socotra. Grunshaw 1991: 39.

Diagnostic notes. *Heteracris annulosa* has a broadly rounded male subgenital plate without an attenuated apex. The general colouration is variable and the tegmina have large brown spots merging into transverse bands. Hind wings are colourless. The internal surface of the hind femora is always with median and distal black spots. Spots on the external surface are variable, generally median and distal spots, sometimes absent. If present, spots on the median external area are always restricted to the upper half of this area, never extending to the median line, like in *H. adspersa*.

Distribution and occurrence. It is widespread in North Africa, the Mediterranean, the Middle East, Central Asia and Arabia (Grunshaw 1991). In the Socotra Archipelago, it has only been found once on Abd el Kuri by Kenneth Guichard (Fig. 39) (Guichard 1967; Grunshaw 1991). He collected six specimens on 7 May 1967, labelled with the locality J. Saleh. According to his travel notes, he went up Jebel Saleh on its north-western slope that date and collected some *Scintharista notabilis* (Walker, 1870) there (Guichard 1967). The material is probably in the NHMUK, but we did not find it.

Habitat and biology. The habitat of *H. annulosa* on the slopes of Jebel Saleh, Abd el Kuri, is probably formed by dry, stony soils with scattered bushes and *Euphorbia abdelkuri* (Fig. 87).

Heteracris coerulescens (Stål, 1876)

Figs 40–42

References for Socotra. Burr 1903: 420 [*partim*; as *Cataloipus oberthüri*]; Uvarov 1921: 131 [as *Bibulus brunni*];

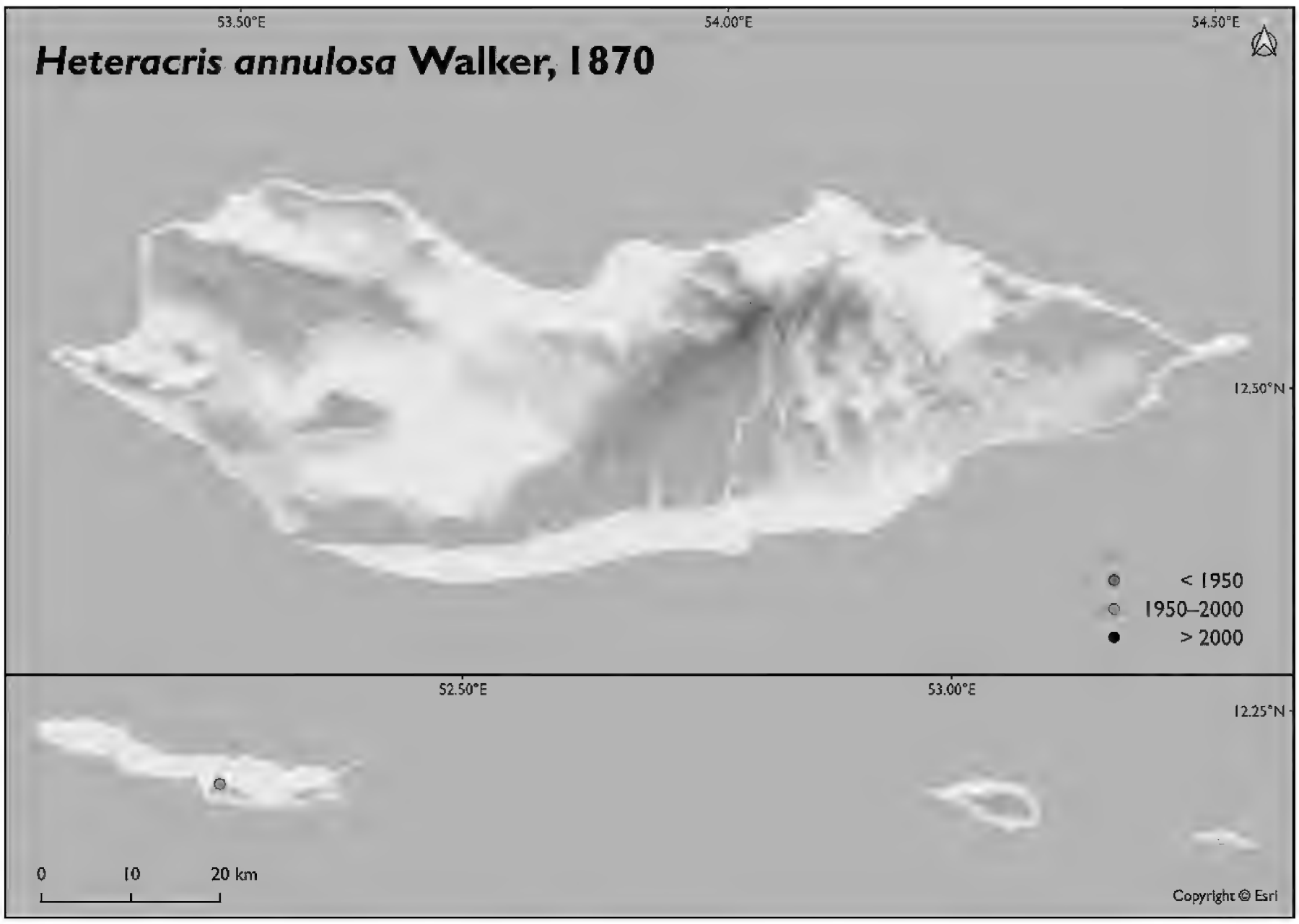

Figure 39. Distribution of *Heteracris annulosa* Walker, 1870 in the Socotra Archipelago.

Popov 1950: 135 [as *Thisoicetrus caerulescens*]; Popov (in Uvarov and Popov (1957)): 375 [as *T. caerulescens*]; Kevan 1967: 86; Grunshaw 1991: 42; Wranik 2003: 322, plate 155; Rowell and Hemp 2017: 184.

Diagnostic notes. Males of this *Heteracris* species can be identified by their uniform colours and the absence of clear external markings (Fig. 41). They are brown with yellow or yellow-green stripes on the sides of the pronotum and folded tegmina. The external median area of the hind femora is brown, without extensive dark spots or bands, while the inner side is marked with a basal, median and distal black band. Females are less uniformly coloured (Fig. 40).

Distribution and occurrence. *Heteracris coerulescens* occurs in north-eastern Africa, south into Tanzania and locally in Yemen. On Socotra, it has only been found on three sites on three occasions (Fig. 42). The first record is from Homhil, collected by Ogilvie-Grant in 1899 and labelled by Burr as *Cataloipus oberthuri* (Burr 1903; Uvarov 1921). The second record is from Hadiboh Plain in 1967, by Guichard. The third is from Wadi Di Farhoh in 2024. Records are from February, April and May.

Habitat and biology. The habitat of *H. coerulescens* on Socotra is unknown because the precise collecting sites are unknown. The specimen collected on 2 May 1967 by Guichard has been collected on or near the same site as where he found *Ochrilidia gracilis*, according to his diary, "a tufted grass habitat" at the foot of Ras Hazira M.... [= Moukaradia Pass], south of Rooget Hill, near Hadiboh" (Guichard 1967).

Figure 40. *Heteracris coerulescens* (Stål, 1876), female. Wadi Di Farhoh, Socotra, 4 Feb 2024 (photograph James Bailey).

In April, Guichard collected other specimens elsewhere on Hadiboh Plain when he went "into the foothills", crossing the plain from his base camp at Sheq (Guichard 1967). On Socotra, it has probably been found between 50–400 m a.s.l. In other parts of its distribution area, like Kenya and Tanzania, it is common in all kinds of bush- and savannah woodlands (Rowell and Hemp 2017; Hemp in litt. 2024).

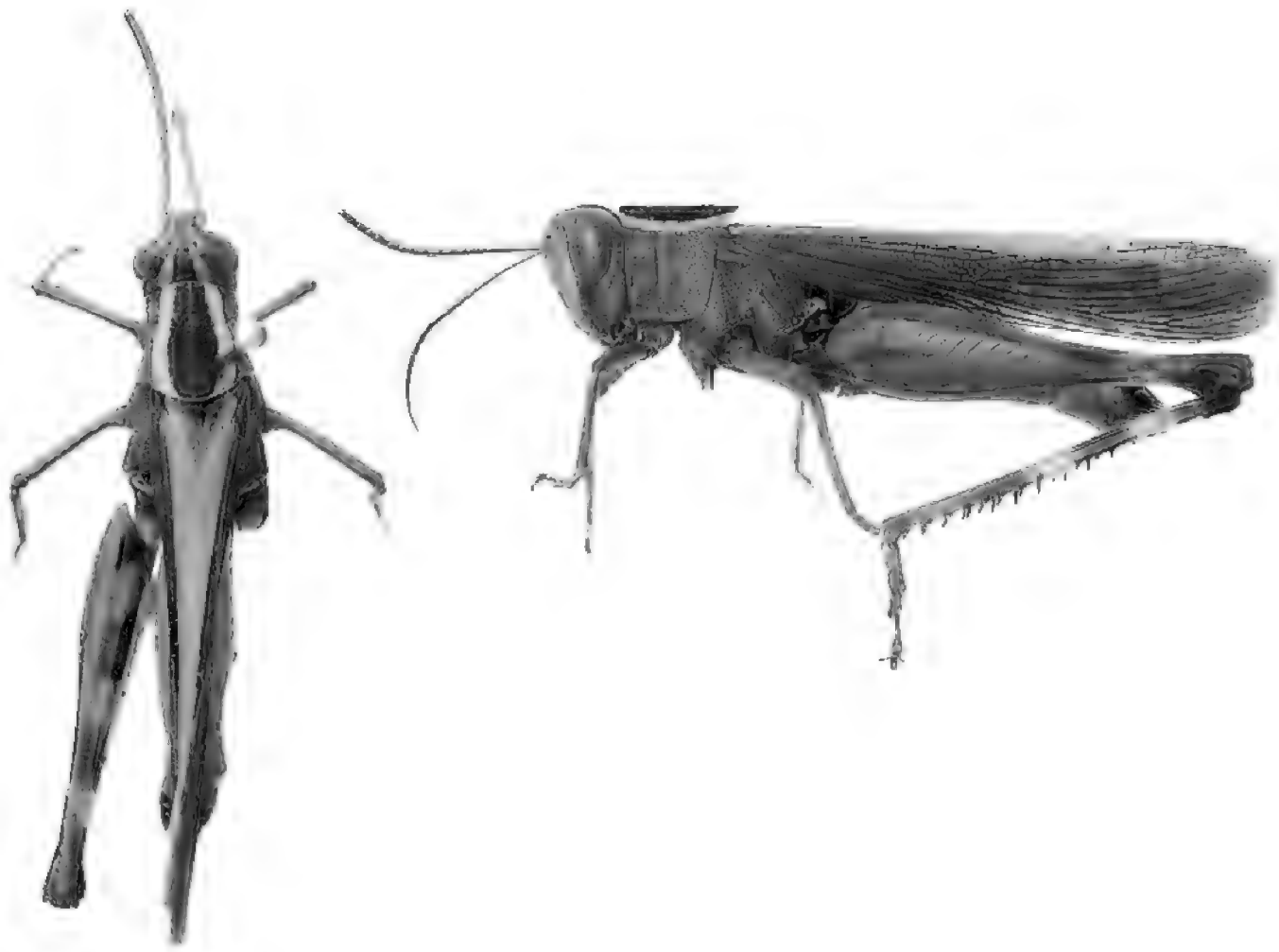

Figure 41. *Heteracris coerulescens* (Stål, 1876), male. Collected by Kenneth Guichard on 11 Apr 1967 on Hadiboh Plain, Socotra. Labels not photographed (photograph Rob Felix).

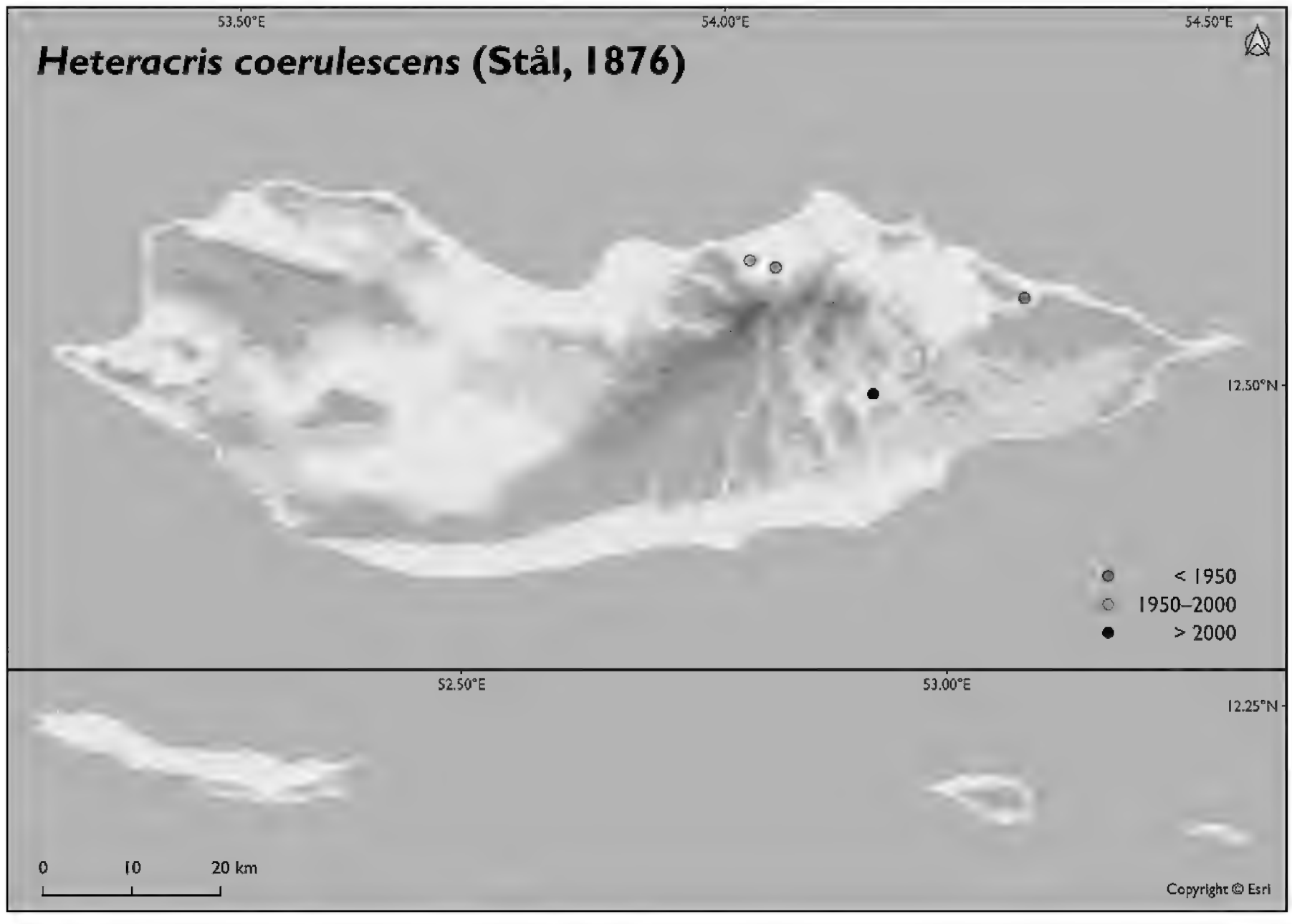

Figure 42. Distribution of *Heteracris coerulescens* (Stål, 1876) in the Socotra Archipelago.

Gomphocerinae

Ermia variabilis Popov, 1957

Figs 43–45

References for Socotra. Popov (in Uvarov and Popov (1957)): 380–382, figs 27–32; Wranik 2003: 325, plate 158.

Diagnostic notes. *Ermia variabilis* is an unmistakable little, brachypterous, stramineously coloured grasshopper (Figs 43, 45). Its flanks have a dark, reddish-brown and broad stripe, starting behind the eyes and continuing over the lateral lobes of the pronotum, the tegmina and the abdomen. Its relatively large head has a strongly sloping frons, ensiform antennae and large elongated eyes.

Distribution and occurrence. *Ermia variabilis* is endemic to Socotra and confined to the Hagher massif, Dixam Plateau, Hamadero hills, Homhil and the Maaleh hills (Cheyrha) (Fig. 44). At Adho Dimello, it is abundant.

Popov collected one of the paratypes at Bijo, positioned on the map presented in Uvarov and Popov (1957) at 185 m a.s.l. It contradicts the statement by the same author that the species occurs above 2000 ft (609 m a.s.l.) (Popov in Uvarov and Popov (1957)). The label information is probably inaccurate and the specimen most likely has been found much higher in the mountains than at Bijo.

For remarks on Guichard's collecting site on Mt. Shihali on 20 April 1967, see the species account of *Dioscoridus depressus*.

Habitat and biology. On Socotra, *E. variabilis* occurs in dense vegetations of grasses and herbs in Frankincense woodland and forest, montane meadows with *Hyparrhenia* and *Themeda*-grasses (Fig. 45) and at lower elevations in savannah woodland (Cheyrha) and submontane grasslands (Dixam). Apart from the probably erroneous record at Bijo (185 m a.s.l), the species is recorded from 400–1100 m a.s.l. Records are from February to April, October and November.

Bioacoustics. This species possibly produces a song, but it is unknown.

Ochrilidia cf. *O. geniculata* (Bolívar, 1913)

Fig. 46

Diagnostic notes. The specimen collected by Wranik on Abd el Kuri fits *Ochrilidia geniculata* following the key of Jago (1977). Its measurements are within the range of the 25 females studied by Massa (2009), except for the shorter hind femur (Table 3). As the identification of *Ochrilidia* species is mainly based on males, we treat the taxon as *Ochrilidia* cf. *O. geniculata*.

Ochrilidia geniculata differs from *O. socotrae* Massa, 2009 primarily in its larger size (Table 3) and

Figure 43. *Ermia variabilis* Popov, 1957, male, holotype. Collected by George Popov at Homhil in 1953. Scale bar: 1 cm (photograph Rob Felix).

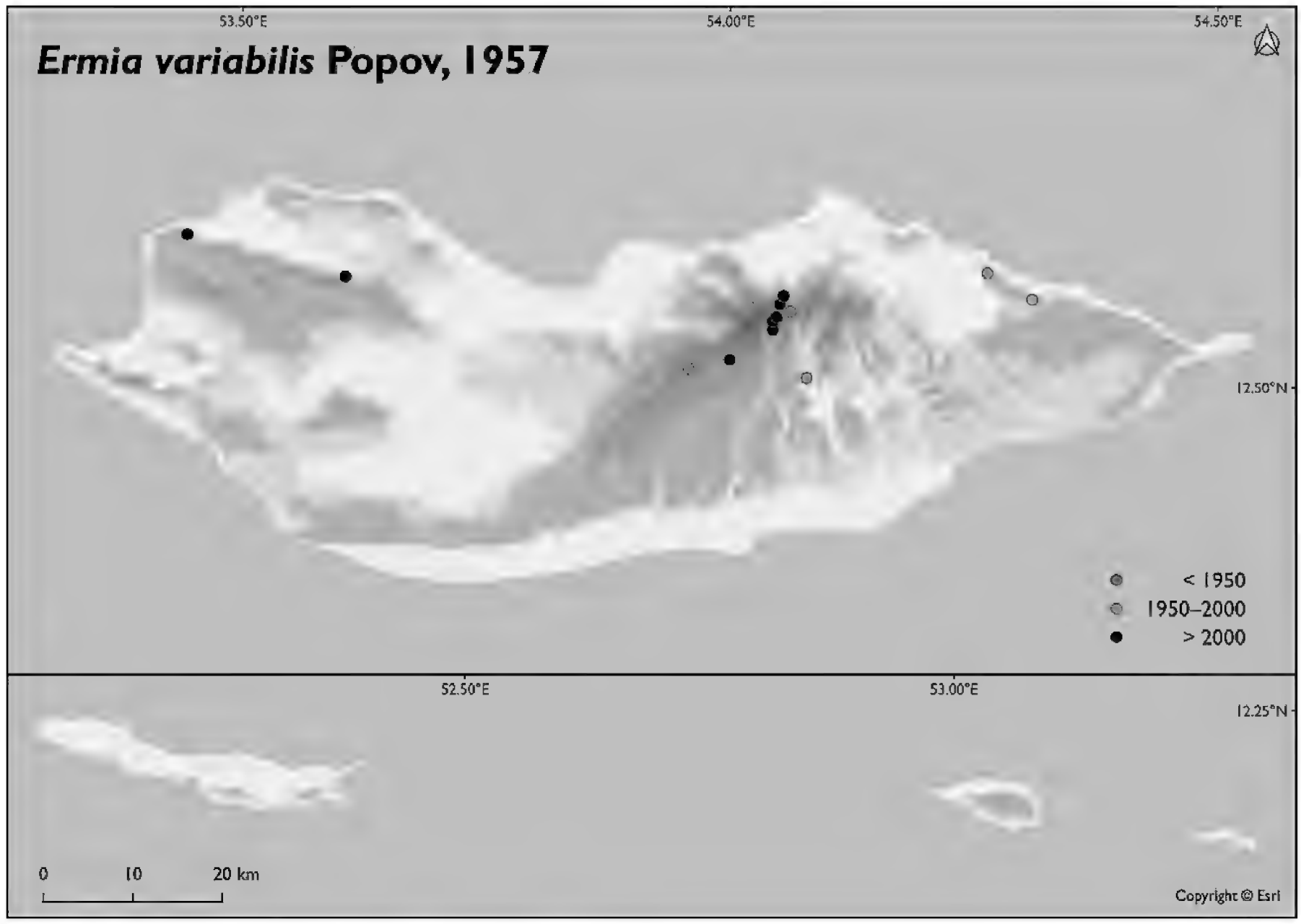

Figure 44. Distribution of *Ermia variabilis* Popov, 1957 in the Socotra Archipelago. The most southern dot on the map represents the record at Bijo, which is probably wrongly placed (see text).

Figure 45. *Ermia variabilis* Popov, 1957, female. Adho Dimello, Socotra, 31 Oct 2020 (photograph left: Robert Ketelaar, right: Rob Felix).

Table 3. Morphometrics of *Ochrilidia geniculata* (Bolívar, 1913) and *O. socotrae* Massa, 2009. Data are from a single female specimen of *O.* cf. *O. geniculata* collected on Abd el Kuri and those of female *O. geniculata* and *O. socotrae* in Massa (2009). Values are in mm.

Specimens	Sex	Length frons–hind knee	Tegmen length	Pronotum length	Hind femur length
Specimen from Abd el Kuri					
Ochrilidia cf. *O. geniculata*	F (n = 1)	33.08	26.10	5.20	13.80
Data from Massa (2009)					
Ochrilidia socotrae	F (n = 5)	26.30 ± 0.77	21.80 ± 0.60	4.54 ± 0.15	13.40 ± 0.40
Ochrilidia geniculata	F (n = -25)	32.41 ± 1.73	29.23 ± 2.05	5.92 ± 0.38	16.60 ± 1.18

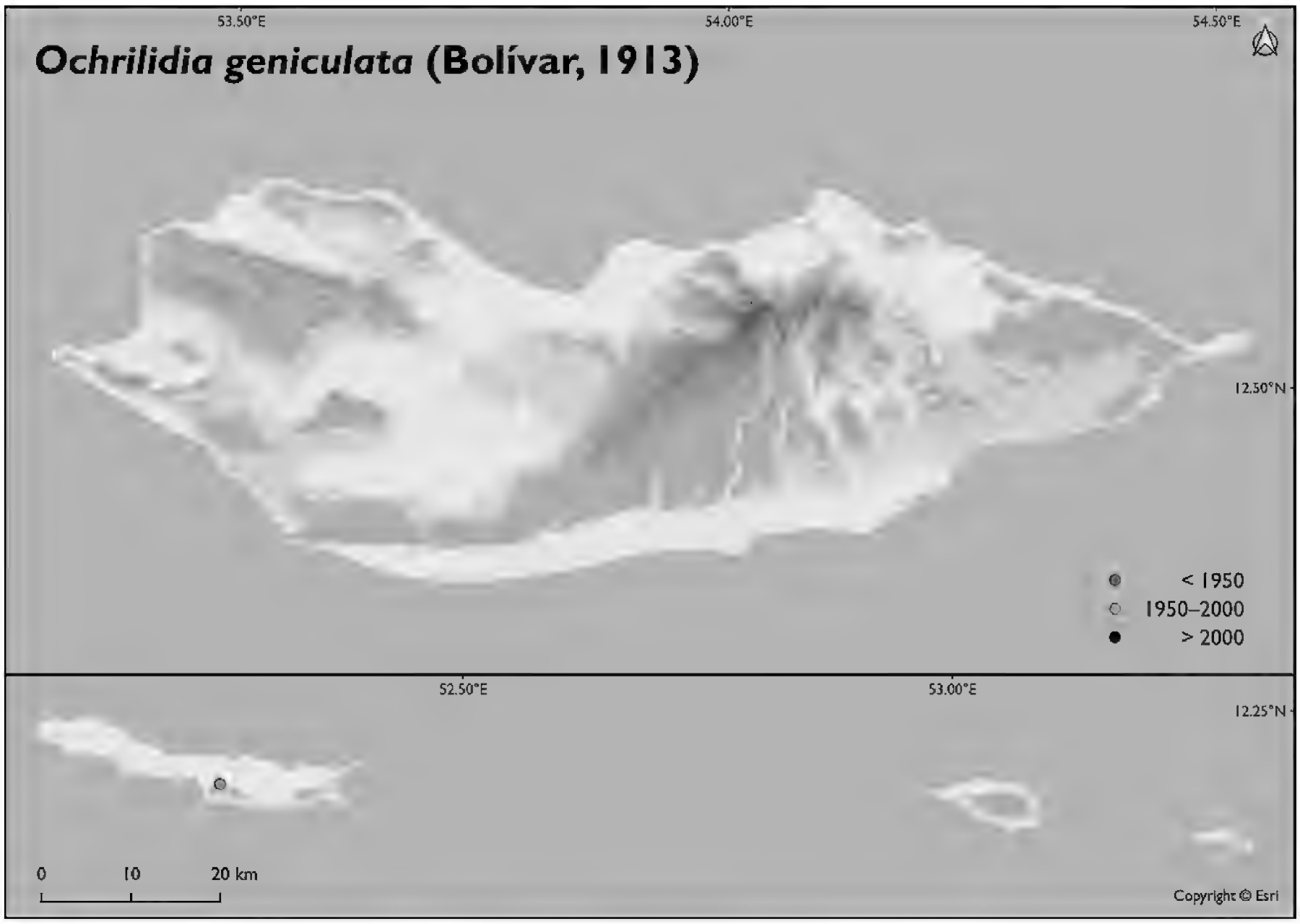

Figure 46. Distribution of *Ochrilidia* cf. *O. geniculata* (Bolívar, 1913) in the Socotra Archipelago.

its temporal foveolae, of which the lower edges are completely visible from above. In *O. gracilis nyuki* (Sjösted, 1909), the temporal foveolae are not visible from above and the inner lower lobes of the hind knees do not have a block dot. The male genitalia are species-specific.

Distribution and occurrence. This species inhabits large parts of northern Africa, south into Kenya, on the Arabian Peninsula and east through Iran into India. There is only one record from Abd el Kuri (Fig. 46).

Habitat and biology. The habitat of *O. geniculata* on Abd el Kuri is unknown.

Bioacoustics. The song of this species is unknown.

Ochrilidia gracilis nyuki (Sjösted, 1909)

Figs 47, 48

References for Socotra. Jago 1977: 191, figs 74, 76, 79, 100; Guichard 1992: 186.

Diagnostic notes. The main diagnostic character of *Ochrilidia gracilis nyuki* is its fastigium of the vertex that protrudes extensively in front of the eyes. The part of the fastigium in front of the eyes is much longer than the maximum width of the vertex at the frontal edge of the eyes in dorsal view. In the nominate ssp. (not present on Socotra), the fastigium in front of the frontal edge of the eyes is as long as it is wide (Jago 1977). The antenna segments 2–8 are very wide and flattened compared to the other segments, much more so than in the two other occurring species. The temporal foveolae are invisible from above (Fig. 47) (Jago 1977). The inner ventral lobes of the hind knees do not bear a black dot.

Distribution and occurrence. *O. gracilis* occurs in North Africa and the Middle East, eastwards through Iran and into India. The ssp. *nyuki* is confined to the Horn of Africa and Socotra. Its occurrence on Socotra is only known from one collecting event at Hadiboh Plain in 1967.

Habitat and biology. According to Guichard's travel journal, *O. gracilis* has been found in a "new tufted grass habitat near the foot of Ras Hazira M.... [= Moukaradia

Figure 47. *Ochrilidia gracilis nyuki* (Sjösted, 1909), male. Collected by Kenneth Guichard on Hadiboh Plain, at the foot of Rooget Hill, Socotra, in 1967. Scale bar: 1 cm (photograph Rob Felix).

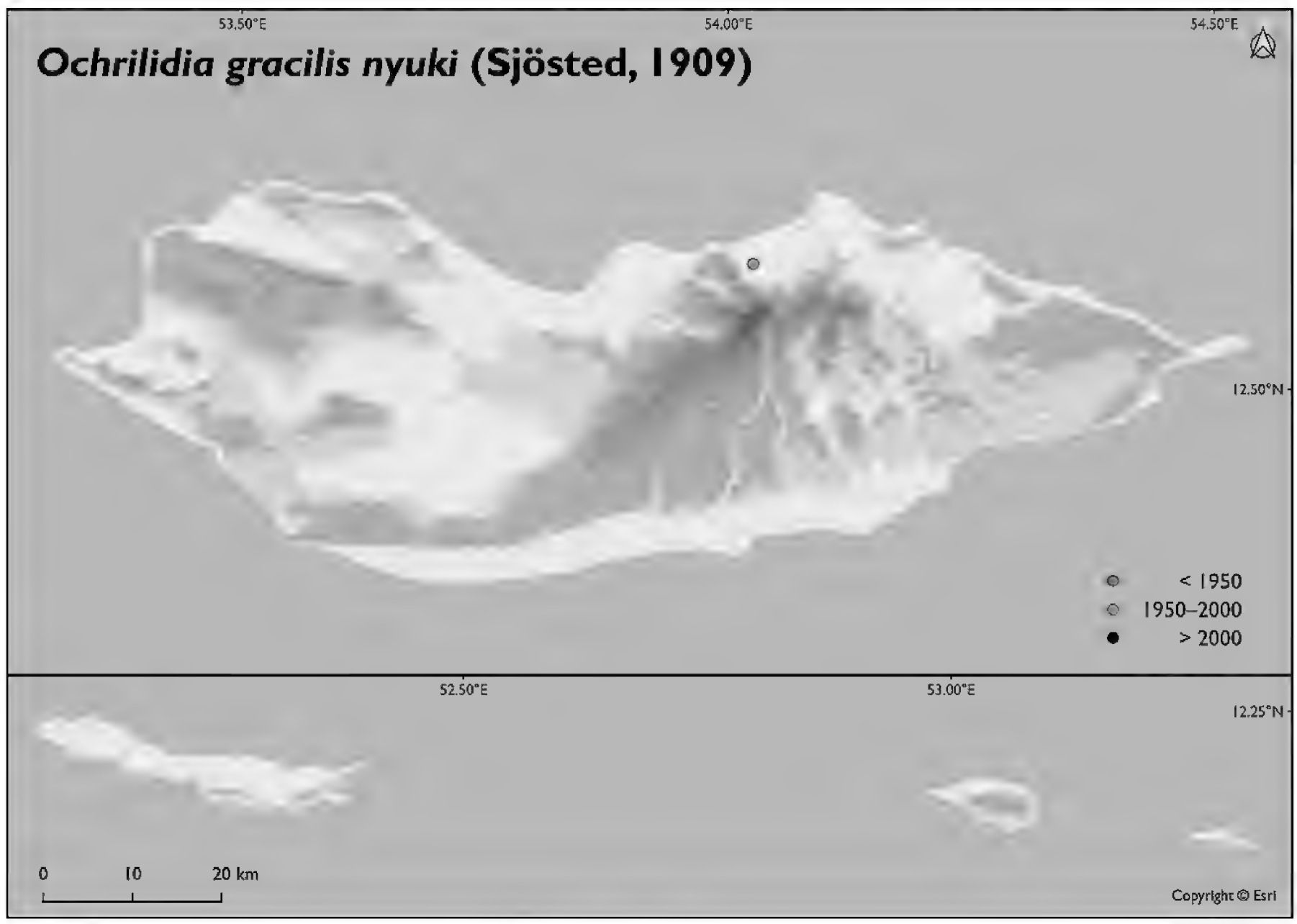

Figure 48. Distribution of *Ochrilidia gracilis nyuki* (Sjösted, 1909) in the Socotra Archipelago.

Figure 49. *Ochrilidia socotrae* Massa, 2009, male. Neet, Socotra, 28 Oct 2010 (photograph Robert Ketelaar).

Figure 50. *Ochrilidia socotrae* Massa, 2009, female. Erisseyl, Socotra, 3 Nov 2010 (photograph Robert Ketelaar).

Pass], north [not north, but west] of Hadiboh". Jago (1977) described the habitat of *O. gracilis* as riverine floodplains and well-watered areas by run-offs from massifs and plateaus. Adaptation to these wet habitats in north-eastern Africa and Socotra has led to the evolution of the elongated ssp. *nyuki* according to Jago (1977).

Bioacoustics. The song of this species is unknown.

Ochrilidia socotrae Massa, 2009

Figs 49–53

References for Socotra. Popov (in Uvarov and Popov (1957)): 379 [as *Ochrilidia kraussi*]; Jago 1977: 180 [as *Ochrilidia kraussi*]; Wranik 2003: 324, plates 153, 158 [as *Ochrilidia gracilis*]; Massa 2009: 59–63, figs 20–25, 27, 29, 30.

Diagnostic notes. *Ochrilidia socotrae* can be separated from *O. gracilis nyuki* by a shorter protruding fastigium of the vertex: the length in front of the eyes is equal to the width of the vertex at the frontal edge of the eyes, in dorsal view. The inner lower lobe of the hind knee has a black dot.

Taxonomic notes. Popov collected four *Ochrilidia* specimens at Shuab in 1953 (Fig. 51) and identified these as *O. kraussi* (Bolívar, 1913) (Popov in Uvarov and Popov (1957)). However, he mentioned some differences with *O. kraussi* specimens from different African sites. These differences are mainly in the shape of the metazona of the pronotum: in the Socotran specimens, it is as long as wide, while in other *kraussi* specimens, it is often longer than wide. Specimens of *O. kraussi* from Somalia resemble the Socotra taxon (Popov in Uvarov and Popov (1957)).

In his revision of the genus *Ochrilidia*, Jago (1977) synonymised *O. kraussi* with *O. geniculata*, including Popov's specimens of Socotra. Jago (1977) erroneously listed the four Socotran specimens under Ethiopia instead of Yemen. Massa (2009), therefore, was misled when he interpreted Jago as not having studied the Socotran specimens.

Massa (2009) described *O. socotrae*, based on specimens he collected at Shuab in 2008, the same site where Popov collected his specimens. He mentioned the following characteristics of *O. socotrae* that separate this taxon from *O. geniculata* from Africa and Arabia: overall smaller, shorter wings, a less marked black spot on the inner side of the hind knees, a less pointed subgenital plate, shorter cerci and less stridulatory pegs.

According to Massa (2009), the length and width ratio of the metazona does not differ between *socotrae* and *geniculata*, contrary to Popov's statement about *kraussi* (in Uvarov and Popov (1957)).

After comparison, Popov's specimens belong to *O. socotrae*, which is unsurprising since they come from the same site and habitat.

Distribution and occurrence. *Ochrilidia socotrae* is endemic to Socotra. This species has only been found on three sites in coastal dunes near the two outermost capes of Socotra, Shuab and Neet in the west and Erisseyl in the east (Fig. 52). The species can be common in suitable habitat.

Habitat and biology. *O. socotrae* is strictly associated with *Urochondra setulosa* (syn. *Heleochloa dura*) (Popov in Uvarov and Popov (1957); Massa 2009). These grasses grow in narrow fringes of coastal dunes at an elevation of 0–10 m a.s.l. (Figs 2, 3). Adults are found year-round and nymphs are found in February and November (Popov in Uvarov and Popov (1957); Massa 2009).

Ochrilidia gracilis and *O. kraussi* are intermixed in Wranik (2013): *O. gracilis* is mentioned as occurring in *Heleochloa dura* in Shoab and *O. kraussi* is mentioned as occurring elsewhere in Arabia in wet grasslands. The reverse is true. The former occurs in humid grasslands (also on Socotra; ssp. *nyuki*), while the latter, as *O. socotrae*, occurs in *U. setulosa* (*H. dura*) vegetation.

Bioacoustics. The calling song consists of 20–30 syllables repeated at 3–4 per second. Syllables last 90–110 ms and consist of a short, sharp tick-sound of about 25 ms followed by a weaker rustling sound (Fig. 53). The tick-sound is probably linked to the upward movement of both hind legs. During interaction with other males, a series of syllables may be shorter or may lead to the production of alternating syllables of the males involved. Additionally, some weaker shortly buzzing sounds can be heard, possibly linked to situations where a female is close to the male.

The same syllabic structure can be found in the song of *Ochrilidia sicula* (Salfi, 1931) (Baudewijn Odé, XC846260, accessible at https://www.xeno-canto.org/846260) and *O. pruinosa* Brunner von Wattenwyl,

1882 (Willemse et al. 2018). However, in the latter species, the syllables are adjoined in a dense echeme.

Stenohippus socotranus (Popov, 1957)

Figs 54–57

References for Socotra. Popov (in Uvarov and Popov (1957)): 382–383, fig. 36 [as *Leva socotrana*]; Jago 1996: 114–116, 120, figs 153–155, 182; Wranik 2003: 325, plate 158 [as *Leva socotrana*].

Diagnostic notes. The Socotran material can be recognised as *Stenohippus*, based on the main characteristics according to the key in Jago (1996): frontal ridge flat to slightly convex above the median ocellus, while lightly concave below it; long-winged; temporal foveolae rhomboid; well-developed lateral carinae in prozona and metazona of the pronotum.

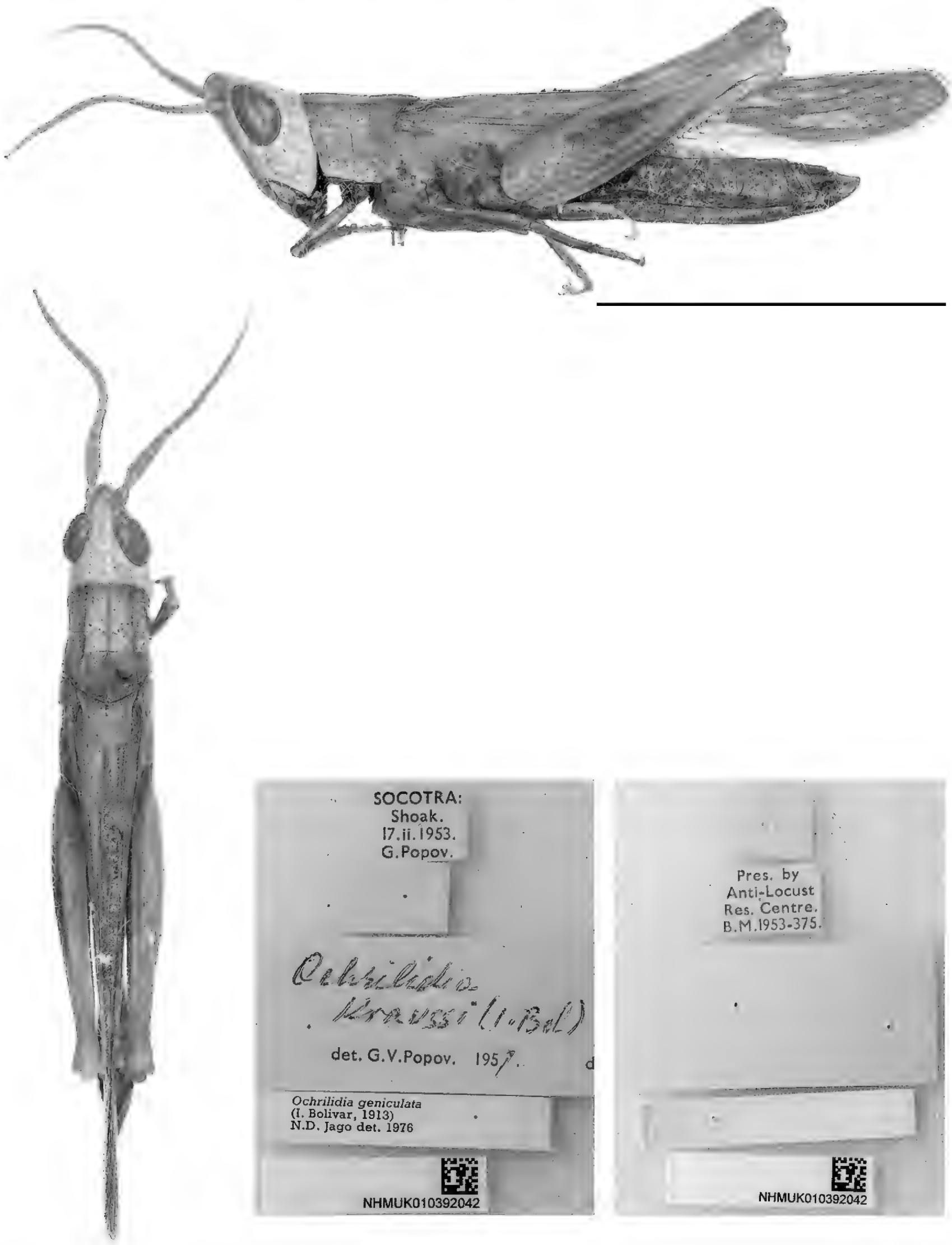

Figure 51. *Ochrilidia socotrae* Massa, 2009, male. Collected by George Popov at Shuab, Socotra, in 1953. Scale bar: 1 cm (photograph Rob Felix).

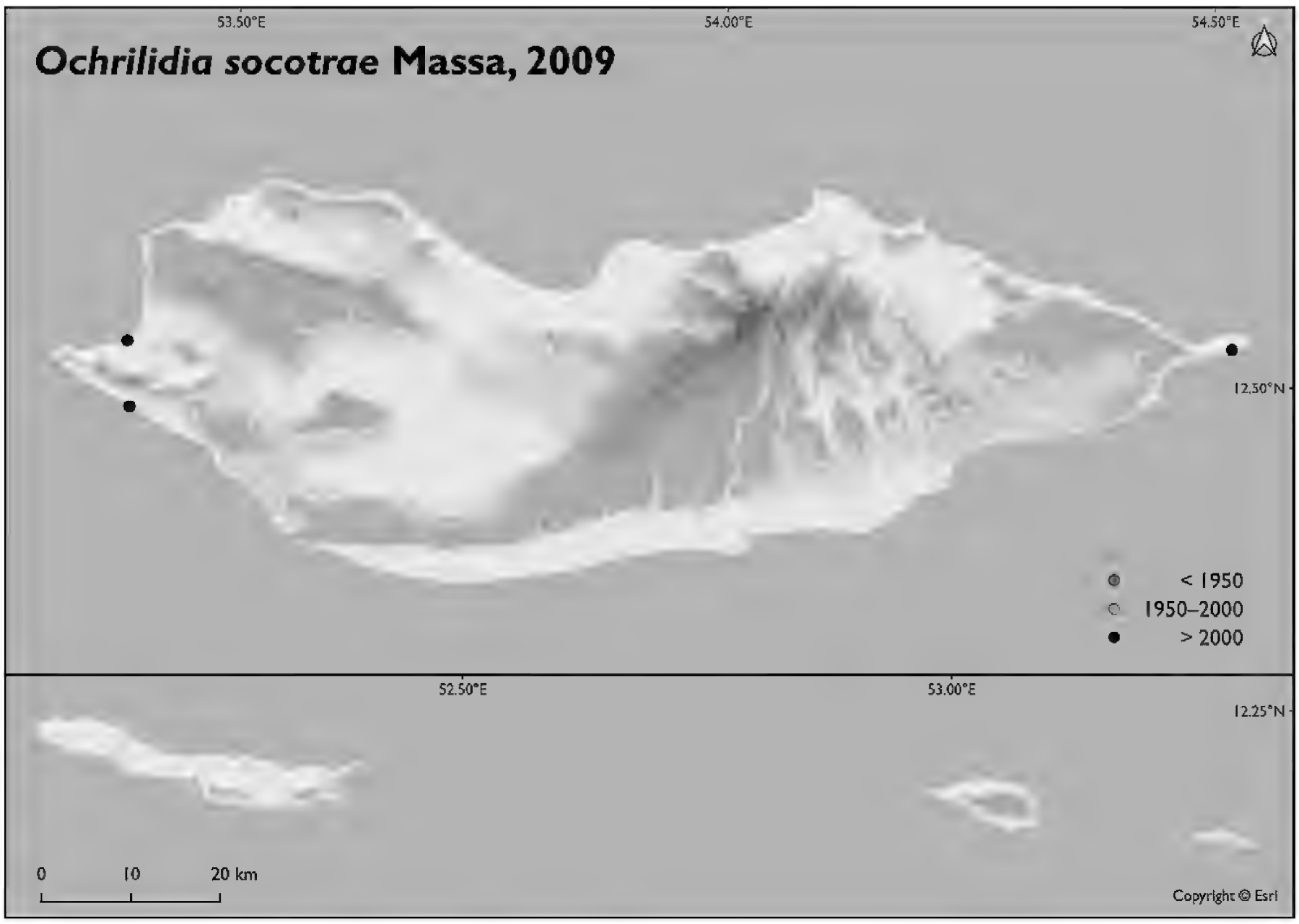

Figure 52. Distribution of *Ochrilidia socotrae* Massa, 2009 in the Socotra Archipelago.

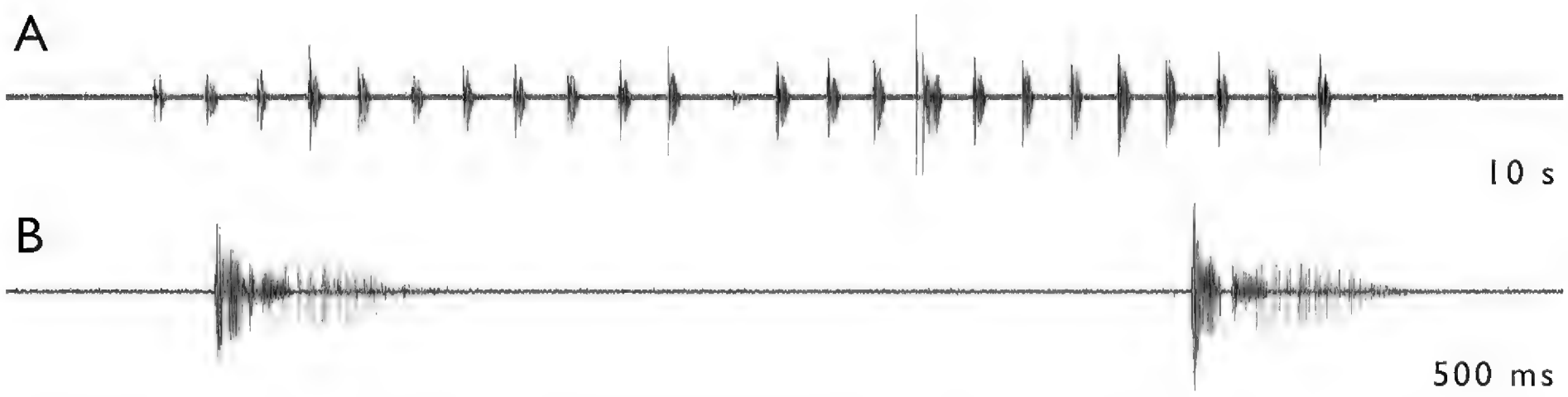

Figure 53. Calling song of *Ochrilidia socotrae* Massa, 2009. Oscillograms depicting 10 s (**A**) and 500 ms (**B**). Neet, Socotra, 28 Oct 2010, 13:42 h; RecRF10112; SpRF10YE020–024; XC877885, accessible at https://www.xeno-canto.org/877885.

S. socotranus can be distinguished from other members of the genus by a longer fastigium of the vertex (narrow, elongated and with an equal width at the level of the transverse groove to the length in front of this groove), relatively short antennae (slightly longer than head and pronotum together) and a prozona of the pronotum that is somewhat shorter than the metazona; see key in Jago (1996)—considered to be closely related to *S. xanthus* (Karny, 1907) occurring in Africa, Asia and Arabia (Oman, Yemen and Saudi Arabia).

Stenohippus socotranus is the only grasshopper on Socotra resembling European Gomphocerinae of the genus *Chorthippus*: a subconical head, sloping frons and subcylindrical pronotum, which is slightly constricted in the prozona and with angularly incurved lateral carinae (Figs 54, 55). Tegmina and hind wings are fully developed and the male subgenital plate is conical.

The genus *Stenohippus* is characterised by a high degree of polychromatism and polymorphism. There is a significant variation in colour patterns and some well-defined variations are separated. On Socotra, the variation *S. socotranus* var. *marginellus* is very common, at least amongst females. This variation is characterised by a large triangular dark brown mark on the pronotal side lobe. This character is accompanied by much less curved lateral carinae in the prozona of the pronotum. Jago (1996) stated that, despite the high degree of polymorphism in *Stenohippus*, the shape and dimensions of the fastigium of the vertex are considered stable to separate species reliably.

Figure 54. *Stenohippus socotranus* (Popov, 1957), male. Dineghen, Socotra, 1 Nov 2010 (photograph Robert Ketelaar).

Taxonomic notes. Popov (in Uvarov and Popov (1957)) temporarily described *Stenohippus socotranus* (Popov, 1957) as a member of *Leva* Bolívar, 1909, despite the fact that he already recognised more similarities with *Stenohippus* Uvarov, 1926 (Fig. 55). Jago (1971) synonymised *Stenohippus* with *Leva*, based on his statement that the sulcation of the upper part of the frontal ridge (above the ocellus) is the only real difference between the two genera. Jago (1996) thoroughly revised *Leva* and *Stenohippus*, restored the latter genus and moved Popov's *socotranus* from *Leva* to *Stenohippus*.

Distribution and occurrence. It is an endemic species to Socotra and widely distributed and common, especially on the plains (Fig. 56). In 2009, it was abundant at Taaqs, Ba'a and Qeysoh.

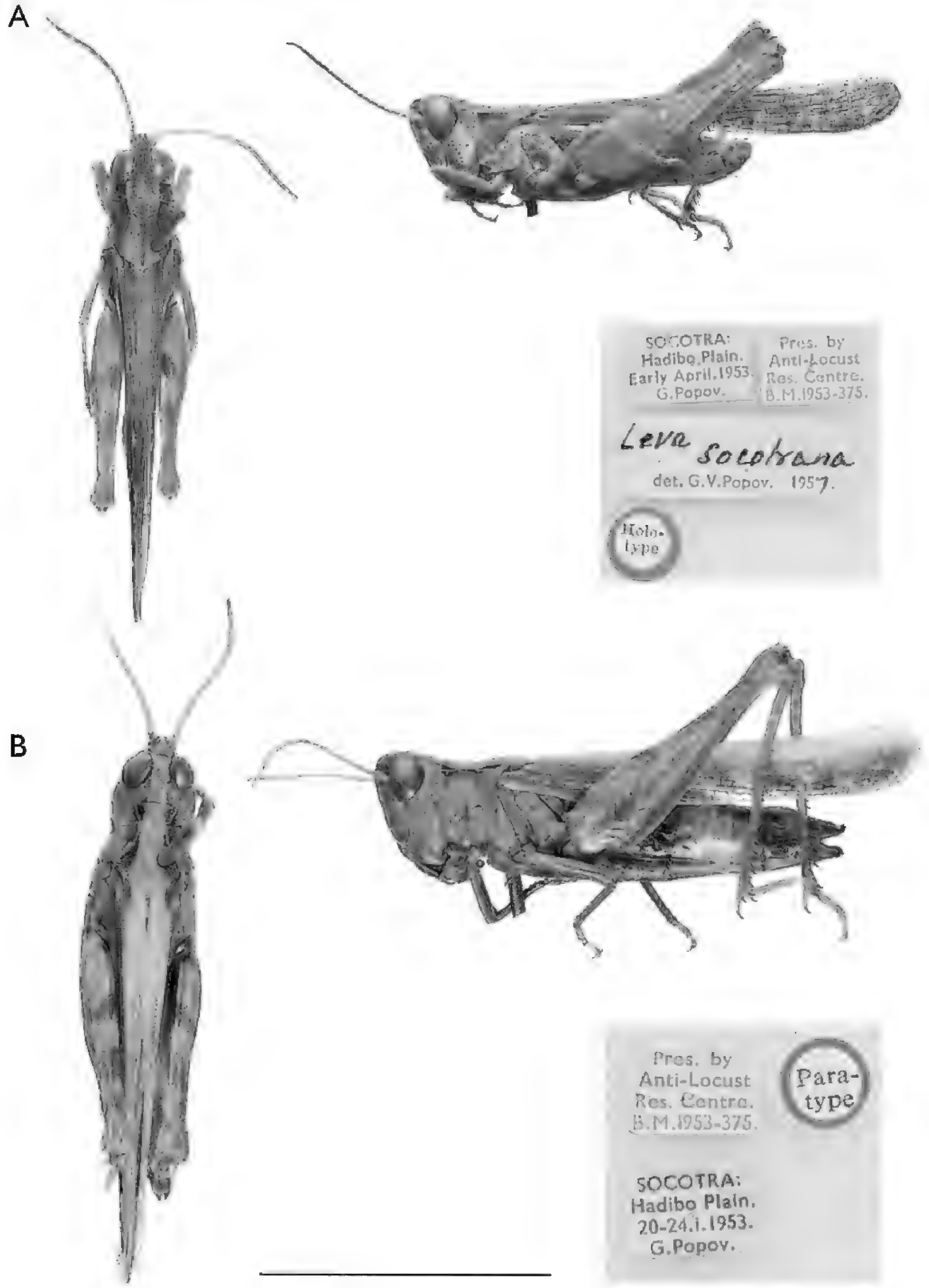

Figure 55. *Stenohippus socotranus* (Popov, 1957), male, female, type specimens. **A.** Male holotype; **B.** Female paratype. Collected by George Popov on Hadiboh Plain, Socotra, in 1953. Scale bar: 1 cm (photograph Rob Felix).

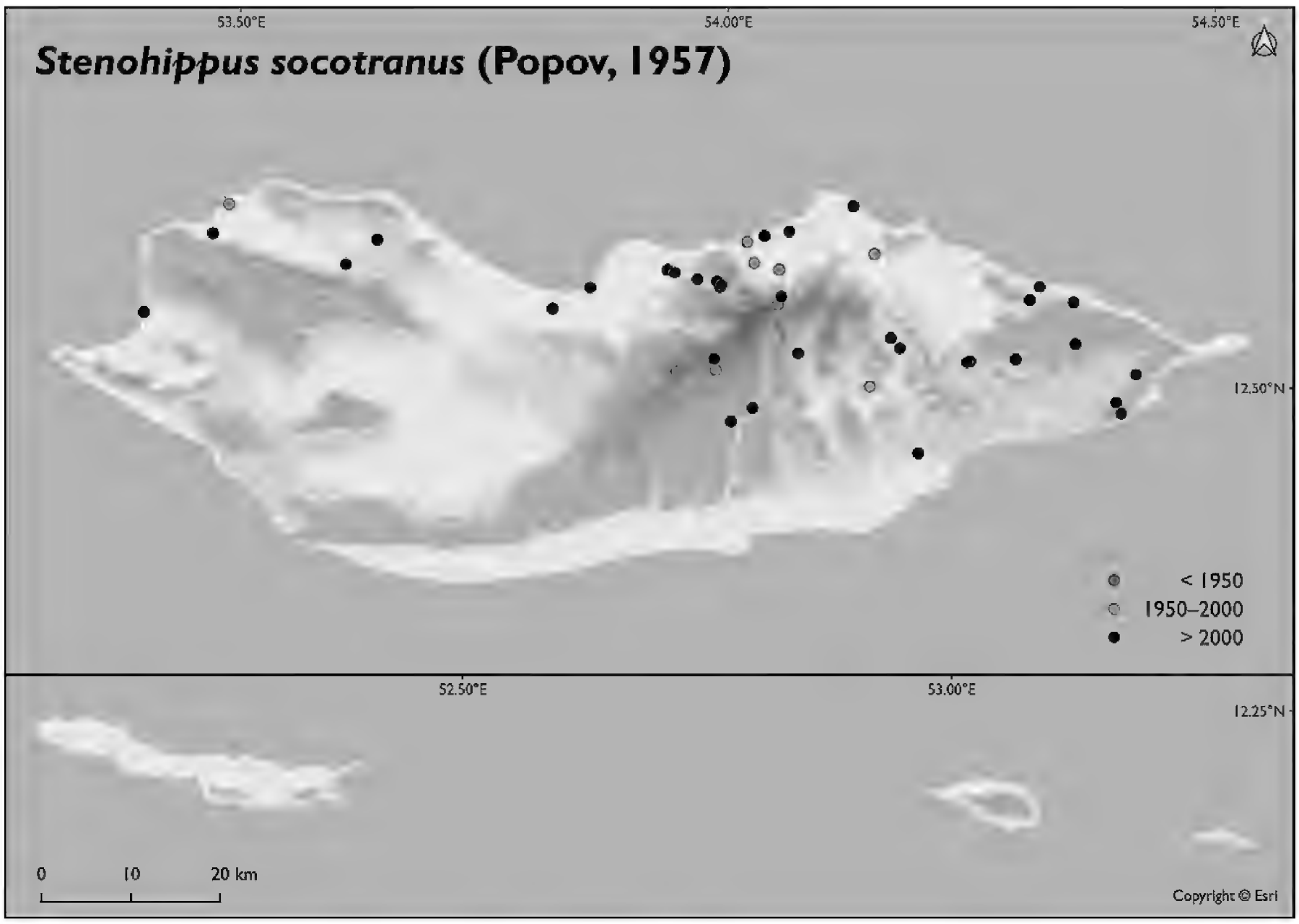

Figure 56. Distribution of *Stenohippus socotranus* (Popov, 1957) in the Socotra Archipelago.

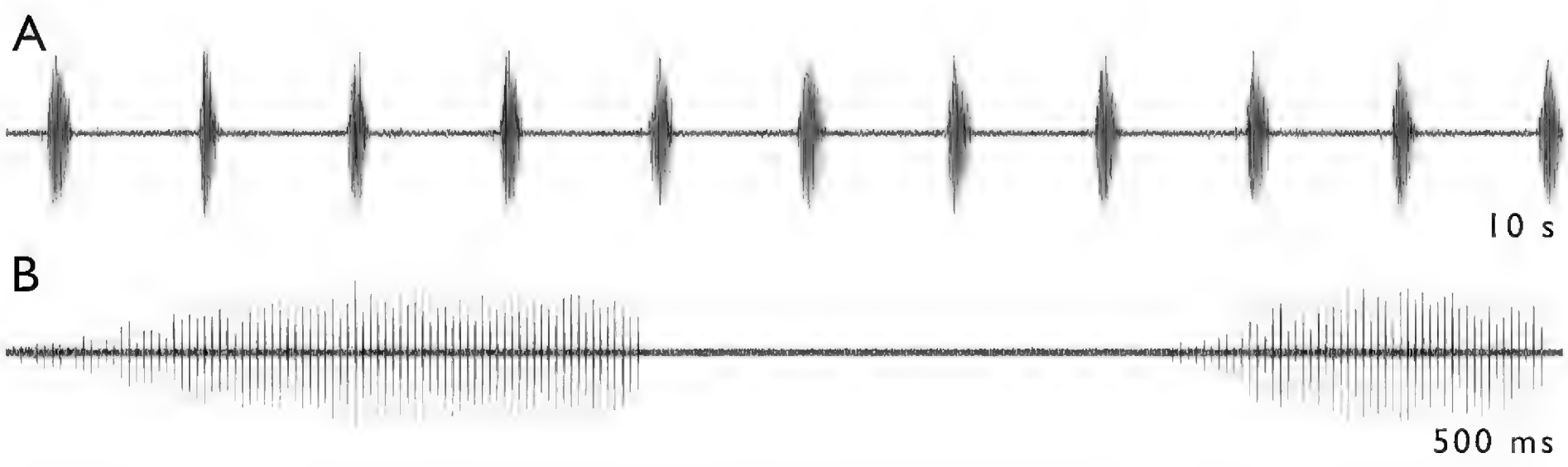

Figure 57. Calling song of *Stenohippus socotranus* (Popov, 1957). Oscillograms depicting 10 s (**A**) and 500 ms (**B**). Dineghen, Socotra, 1 Nov 2010, 10:11 h; SpRF10YE074; RecRF10159; XC877924, accessible at https://www.xeno-canto.org/877924.

Habitat and biology. The typical habitat of *S. socotranus* is open, grassy patches with sparse and low vegetation on plains and hillsides in all lower vegetation types (Fig. 4). It seems absent in typical montane vegetation. It occurs year-round, from 5–1000 m a.s.l.

Bioacoustics. The calling song consists of an echeme lasting 2–4.5 s with about 40–100 syllables repeated at 18–23 per second (Fig. 57A). Syllables last about 10 ms with a weak first part (hardly visible in the oscillograms) and a loud second part (Fig. 57B) (XC877924, accessible at https://www.xeno-canto.org/877924). During rivalry, males produce shorter echemes, sometimes down to a few syllables. The song resembles the song of *Stenohippus mundus* (Walker, 1871), known from the UAE (Buzzetti et al. 2014), but with shorter echemes.

Oedipodinae

Acrotylus incarnatus Krauss, 1907

Figs 58–61, 64, 65

References for Socotra. Burr 1898: 384 [as *Acrotylus longipes*]; Burr 1903: 412, 419 [as *A. longipes*]; Krauss 1907: 17, 19–20, 29 [as *A. longipes* var. *incarnata*]; Uvarov (in Uvarov and Popov (1957)): 378; Wranik 1998: 171; Wranik 2003: 324, plates 153, 157; Massa 2009: 56–57, figs 10, 13, 16; Hemp and Rowell 2020: 104; Wehrt 2021: 5–7 [as *Acrotylus longipes*].

Diagnostic notes. *Acrotylus* Fieber, 1853 is a genus of relatively small and slender Oedipodine grasshoppers characterised by a short, strongly saddle-shaped

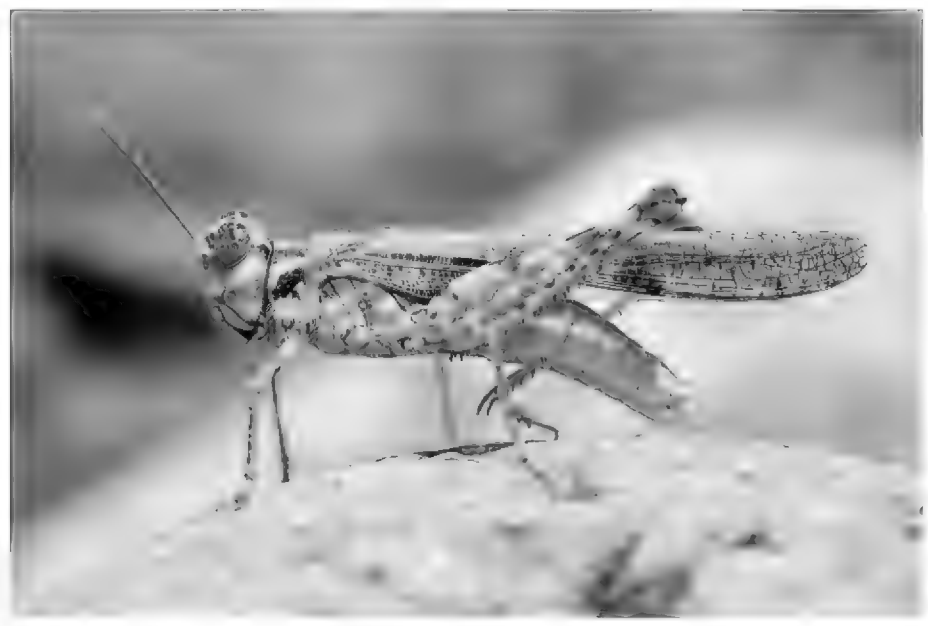

Figure 58. *Acrotylus incarnatus* Krauss, 1907, male. Wadi Ayhaft, Socotra, 26 Oct 2010 (photograph Robert Ketelaar).

pronotum with a dark mark on the lateral lobe, with an off-central white dot (Figs 58–60, 62–65).

Acrotylus incarnatus is slender, long-winged and -legged. The hind wings are basally orange-red without a dark band. The pronotum is smooth with a rounded posterior margin, a weak median carina, weak first and primary transverse sulci and a gently sloping first half of the prozona (Figs 58–60, 64C, F).

A. incarnatus resembles a second species of *Acrotylus* present on the island: *A. innotatus* (Figs 62–65). The latter species is as slender as *A. incarnatus*, but *A. incarnatus* has longer femora of the mid-legs (Fig. 65). The main differences are in the pronota (Fig. 64). *A. innotatus* has a step-like raised frontal half of the prozona in lateral view, a subrounded to slightly

Figure 59. *Acrotylus incarnatus* Krauss, 1907, male, syntype. Collected by Oscar Simony at Shuab in 1899. Scale bar: 1 cm (photograph Rob Felix).

Figure 60. *Acrotylus incarnatus* Krauss, 1907, female. Arher, Socotra, 3 Nov 2010 (photograph Robert Ketelaar).

angular posterior margin and a rugose surface. Hind wings are pinkish-red basally instead of orange-red, like in *A. incarnatus*, although the difference can be subtle. The wings in *A. innotatus* are infumated in the apical half, with prominent black apical spots (Figs 63, 65B), while *A. incarnatus* lacks this infumation.

Taxonomic notes. Krauss (1907) based his description of *A. longipes* var. *incarnata* on specimens collected by Oscar Simony on Socotra in 1899 (Fig. 59), but also lists the specimen collected by Bennet (in 1896–1897) in the description. Therefore, the latter specimen, present in OUMNH, must be considered one of the syntypes. Krauss (1907) mentioned that the described var. *incarnata* is characterised by hind wings with a "meat red" coloured base, contrary to the nominate species in which the base of the hind wing is yellow. He further stated that the same var. occurs in Sicily (It.) and southern Tunisia.

Uvarov (in Uvarov and Popov (1957)) raised Krauss' var. *incarnata* to a full species. He stated that all Socotran specimens have rose-coloured wings and that *A. longipes* is more heavily built and appears "specifically distinct" from *incarnatus*. At the same time, he stated that the Socotran *incarnatus* "do not differ morphologically" from *Acrotylus longipes* var. *meruensis* Sjöstedt, 1932 from East Africa and synonymised the latter with the former.

Massa (2009) raised var. *meruensis* to species level, based on differences in femur length and characteristics of the pronotum and, as a consequence, considered *incarnatus* a Socotra endemic.

Preliminary results of genetic analyses by Wehrt (2021) suggest *incarnatus* to be a junior synonym of *A. longipes*. Until that research has been published more extensively, we here consider *incarnatus* a full species, as indicated by Uvarov (in Uvarov and Popov (1957)) and Massa (2009).

Distribution and occurrence. *A. incarnatus* is endemic to Socotra. It is widespread and very common and one of the most numerous species of grasshoppers (Fig. 61). Despite its abundance and widespread distribution on Socotra, there are no known records from other islands in the Archipelago. *Acrotylus longipes* occurs in southern Europe, northern Africa, Central Asia and the Middle East, including Arabia.

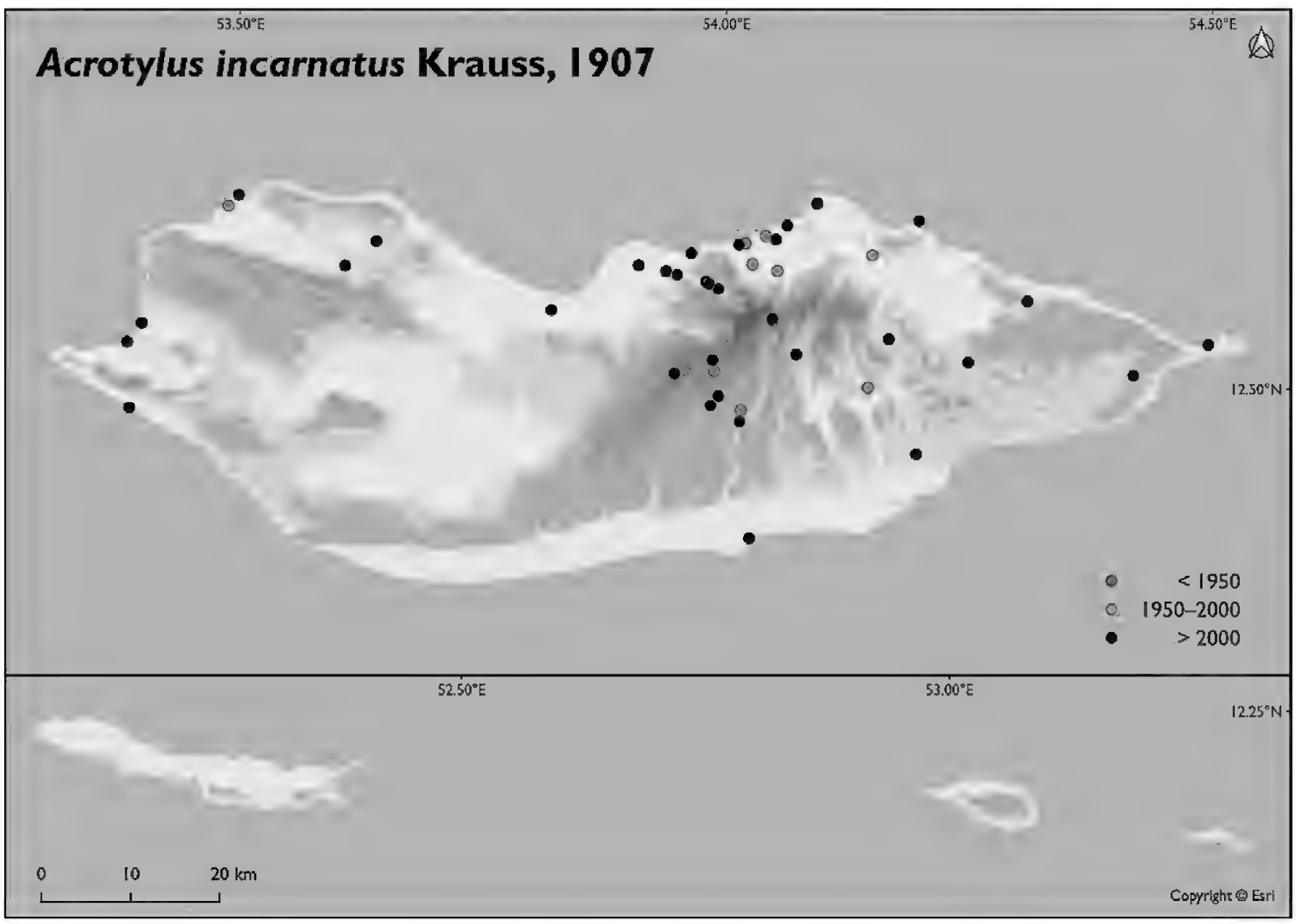

Figure 61. Distribution of *Acrotylus incarnatus* Krauss, 1907 in the Socotra Archipelago.

Figure 62. *Acrotylus innotatus* Uvarov, 1933, male. Wadi Zerig, Socotra, 6 Nov 2010 (photograph Rob Felix).

Habitat and biology. It is a geophilous species of sparsely vegetated, sandy and gravelly soils. Very common on sandy and gravelly plains along the coast, as on stony plateaus and vegetated meadows in the Hagher. Records are mainly from sparse dwarf and low *Croton-Jatropha* shrubland, submontane grassland and open areas within higher-elevation woodlands and forests. It occurs at elevations from 0–1000 m a.s.l. Records are from all seasons.

Bioacoustics. Members of the Oedipodinae subfamily are known to emit quiet, buzzing sounds during rivalry, courtship and flight. From the genus *Acrotylus*, the sounds resemble the noise created by squabbling house sparrows, *Passer domesticus* (Roesti and Keist 2009). On Socotra, sounds have not been recorded.

Acrotylus innotatus Uvarov, 1933

Figs 62–66

References for Socotra. Uvarov 1933: 267 [as *Acrotylus insubricus innotatus*]; Ingrisch 1999: 359, figs 19–20, 66; Massa 2009: 57 [as *Acrotylus insubricus*]; Wehrt 2021: 5–7.

Diagnostic notes. *Acrotylus innotatus* differs from *A. incarnatus* as follows: in lateral view, *A. innotatus* has a step-like raised instead of a gently sloping first half of the prozona. The posterior margin of the pronotum is subrounded to slightly angular instead of rounded and the pronotum has a rugose instead of a smooth surface. The hind wings are basally pinkish-red instead of orange-red, as in *A. incarnatus*, although the difference can be subtle (Figs 63–65). *A. innotatus* has shorter mid-femora than *A. incarnatus* (Fig. 65B).

Preliminary results of genetic analyses of the holotype of *A. innotatus* and several of our Socotran specimens confirm the identification of our Socotran material (Wehrt 2021). Socotran specimens differ morphologically to some extent from the type specimens. The ratio of the prozona and metazona of the pronotum seems to be smaller (a relatively long metazona) compared to the type specimens. The darkening of the apical halves of the wings is less pronounced

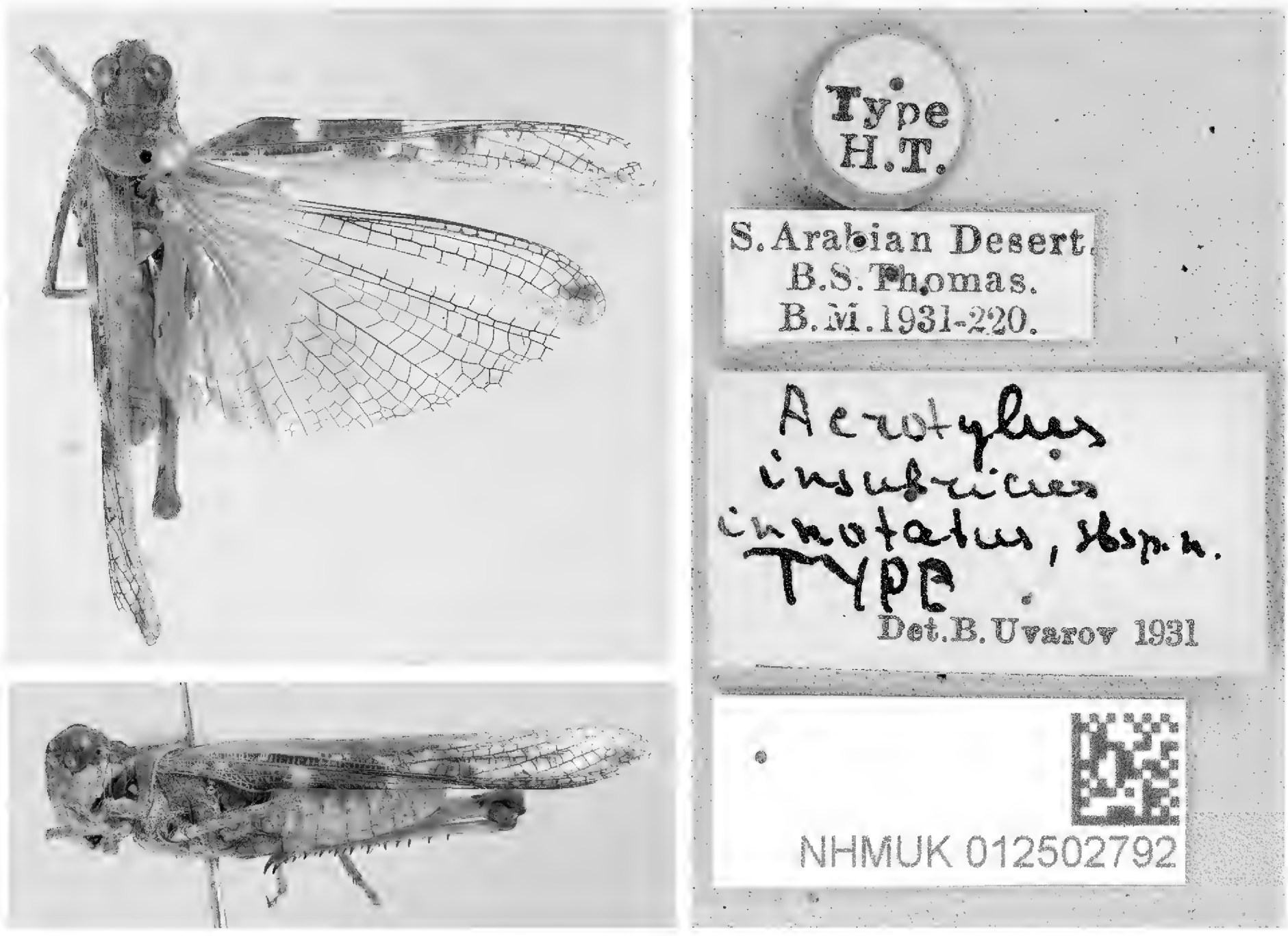

Figure 63. *Acrotylus innotatus* Uvarov, 1933, male, holotype. Collected in the south Arabian Desert between 10 Dec 1930 and 5 Feb 1931 by Bertram S. Thomas (photograph Rob Felix).

and sometimes hardly visible (Figs 63, 65). However, these differences are likely to represent local variations.

Acrotylus innotatus differs from *A. insubricus* (Scopoli, 1786) as a former subspecies of the latter by a slimmer habitus, relatively longer tegmina and, most importantly, the absence of a dark band on the hind wings (Uvarov 1933). The name *innotatus*, meaning unmarked, may refer to that character. *A. insubricus* does not occur on Socotra. Massa (2009) mentioned *A. insubricus* to be present on Socotra, referring to *A. innotatus* (as a former ssp. of *A. insubricus*) (Massa, in litt).

Taxonomic notes. Uvarov (1933) described *Acrotylus insubricus innotatus*, based on specimens collected in several countries: the Arabian Peninsula, Iran and Somalia. All are deposited in the NHMUK. The male holotype (Fig. 63), together with 24 paratypes, was collected in the "South Arabian Desert" between 10 December 1930 and 5 February 1931 by Bertram Thomas during a camel journey from Dhofar (Oman) to Doha (Qatar) (Thomas and Wyllie 1931; Uvarov 1933). When Uvarov first saw Thomas' specimens, he thought they belonged to *A. incarnatus* from Socotra. Only after studying the type of that species did Uvarov (1933) realise *incarnatus* is more closely related to *longipes*, while Thomas' specimens were closer to *Acrotylus insubricus* (Scopoli, 1786). We found several specimens of *A. innotatus* identified as *incarnatus* in Popov's material from Socotra collected in 1953 (Uvarov in Uvarov and Popov (1957)). When working out the Socotran material, Uvarov probably did not have *innotatus* in mind anymore. Finally, Ingrisch (1999) raised *A. insubricus innotatus* to a full species, based on three specimens collected in Yemen in 1996 and 1998.

After examining the specimens, based on which Ingrisch raised *A. insubricus innotatus* to a full species, we conclude they do not belong to *A. innotatus*. Ingrisch (1999) stated that *innotatus* has a "distinctly different pronotum" from *insubricus*. After studying the type series, the pronotum, in reality, appeared much like that of *A. insubricus*, especially the step-like raised frontal half of the prozona (Fig. 64D). Drawings of the pronotum of the specimens from mainland Yemen in figs 19, 20 on p. 372 in Ingrisch (1999) do not show a step-like raised frontal half of the prozona and only display the principal sulcus, no secondary one. In the holotype of *A. innotatus*, the pronotum in lateral view is precisely like Ingrisch's drawing of *insubricus* (fig. 18, p. 372).

Re-description. Since Uvarov (1933) gave a limited species description and Ingrisch (1999) raised the taxon to the species level, based on specimens belonging to a different species, we provide a short re-description based on the type material. Apart from the characters already mentioned by Uvarov (1933), *A. innotatus* is characterised by a step-like raised anterior half of the prozona in front of

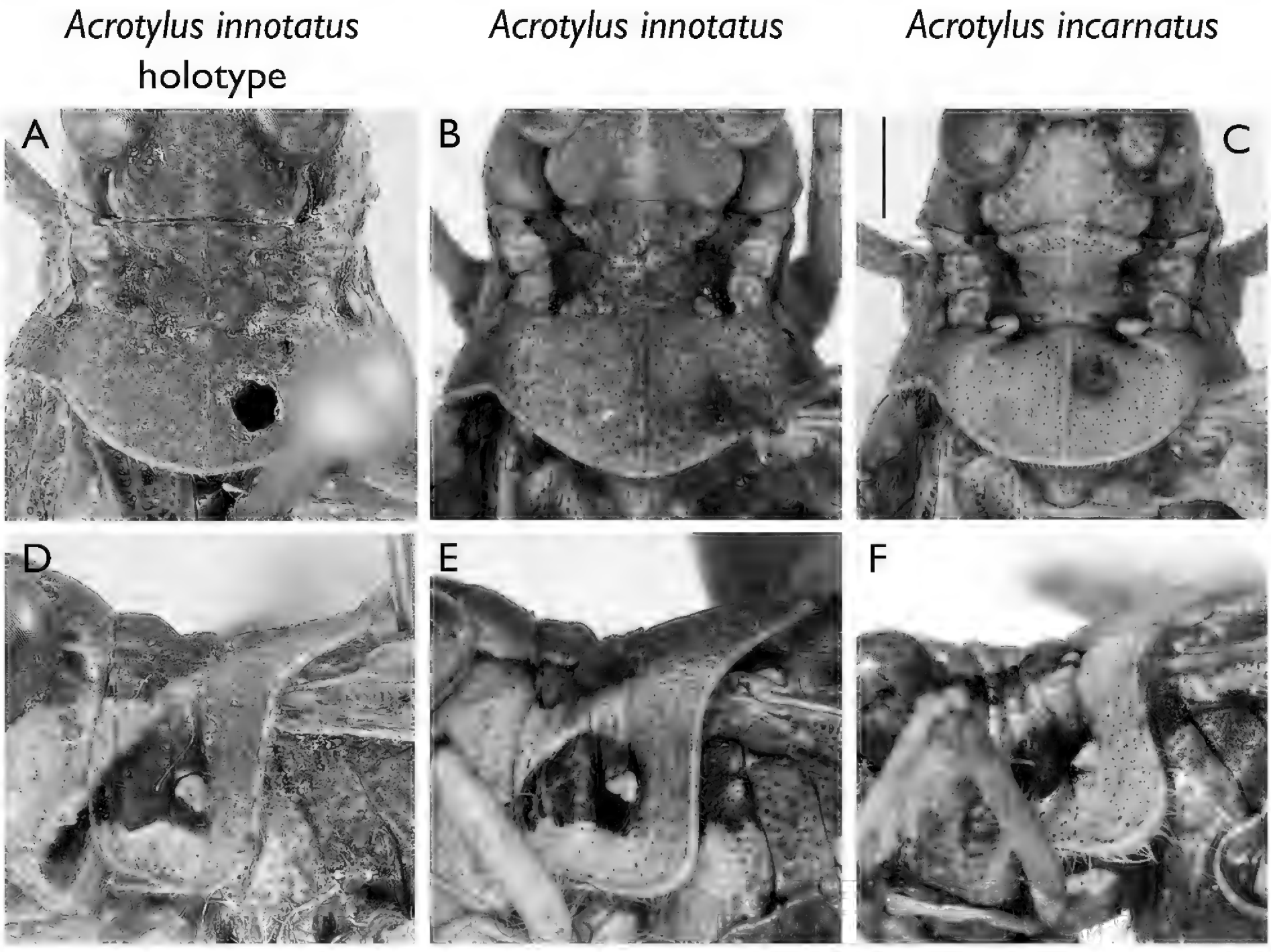

Figure 64. *Acrotylus pronota*, dorsal and lateral views. **A, D.** *Acrotylus innotatus* Uvarov, 1933, male, holotype (NHMUK012502792); **B, E.** *A. innotatus*, male, Wadi Zerig, Socotra (SpRF09YE240); **C, F.** *Acrolytus incarnatus* Kraus 1907, male, Hawlaf, Socotra, 20 Feb 2009 (SpRF09YE227). Scale bar: 1 mm (photographs Roy Kleukers).

the first transverse sulcus (Fig. 64D). The pronotum has a well-pronounced median carina cut/impressed by two sulci, the mentioned first transverse sulcus and the principal sulcus. The dorsal part of the pronotum is strongly sculptured. The posterior margin of the pronotum is subrounded (Fig. 64A). The base of the hind wing is pinkish-red with a more or less darkened (infumated) apical half and dark spots are present on the apex of the hind wing (Fig. 63).

Distribution and occurrence. Based on the type series of *A. innotatus*, the species occurs from Somalia through the Arabian Peninsula into Iran. Future studies could show that the actual distribution of the species is more restricted than that, as several paratypes from Somalia and Iran might represent other species. Hemp and Rowell (2020) state that *A. innotatus* only occurs in Arabia.

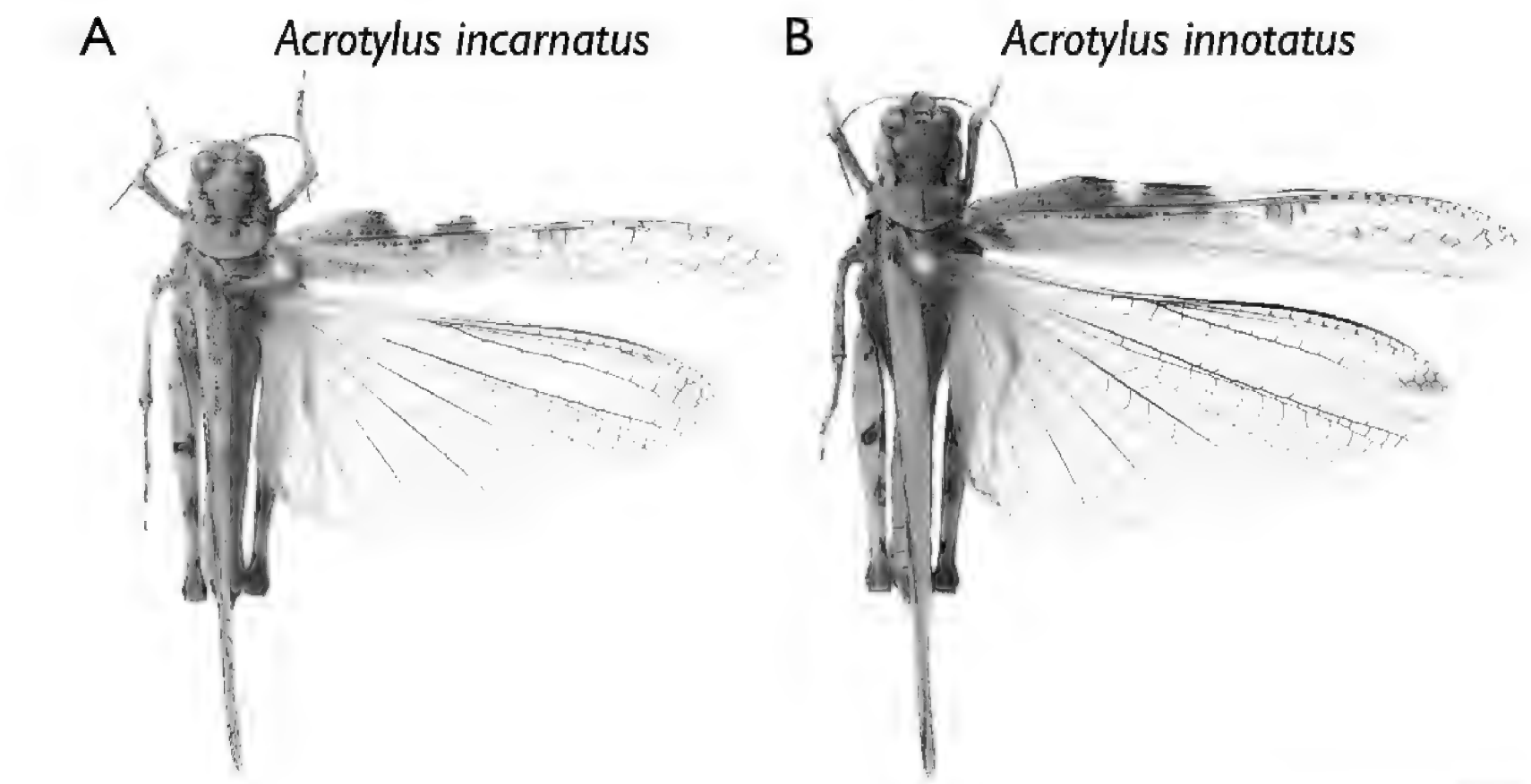

Figure 65. *Acrotylus incarnatus* Krauss, 1907 and A. innotatus Uvarov, 1933, males. **A.** *A. incarnatus* collected at Hawlaf, Socotra, 20 Feb 2009 (SpRF09YE227); **B.** *A. innotatus* collected at Wadi Zerig, Socotra, 21 Feb 2009 (SpRF09YE240); Scale bar: 1 cm (photographs Rob Felix).

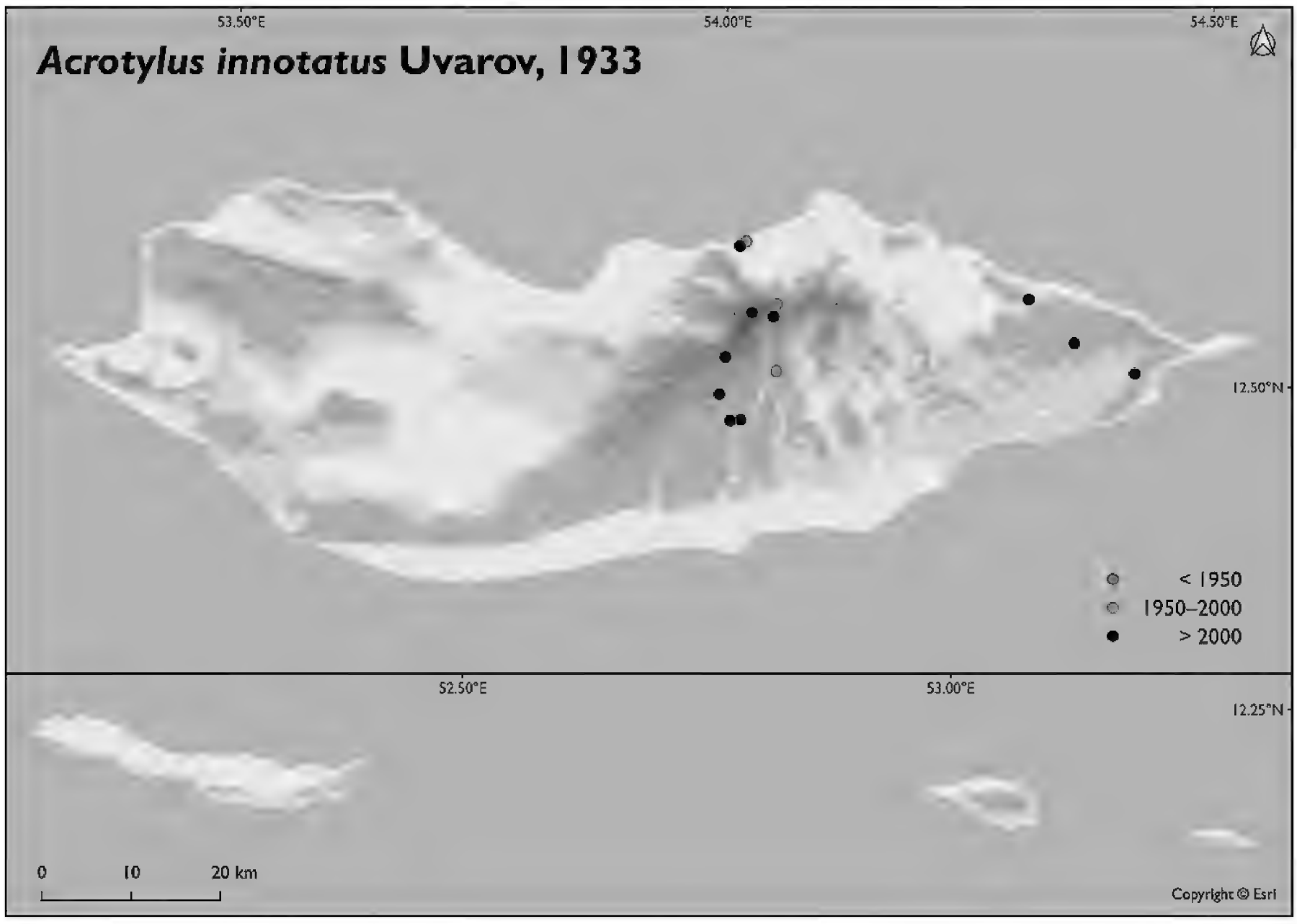

Figure 66. Distribution of *Acrotylus innotatus* Uvarov, 1933 in the Socotra Archipelago.

On Socotra, the species is restricted to the eastern part of the island, occurring on the limestone plateaus of Dixam and Momi and in the Hagher (Fig. 66). Due to the superficial resemblance with *incarnatus*, it is probably overlooked.

Habitat and biology. Uvarov (1933) considered *A. insubricus innotatus* as "restricted to the driest deserts" despite missing information about the collecting sites' habitat. On Socotra, it occurs from 25–1450 m a.s.l. in a variety of habitats, mainly in high shrubland with succulents, Frankincense and *Dracaena* woodland and forests, submontane shrubland and grassland and montane mosaic. Records are from all seasons.

Bioacoustics. Members of the Oedipodinae subfamily emit quiet, buzzing sounds during rivalry. From the genus *Acrotylus*, the sounds resemble the noise created by squabbling house sparrows, *Passer domesticus* (Roesti and Keist 2009). On Socotra, sounds have not been recorded.

Figure 67. *Aiolopus thalassinus* (Fabricius, 1781), male. Adho Dimello, Socotra, 31 Jan 2024 (photograph James Bailey).

Aiolopus thalassinus (Fabricius, 1781)s

Figs 67, 68

References for Socotra. Burr 1903: 412, 417 [as *Epacromia thalassina*]; Krauss 1907: 19, 29 [as *Epacromia thalassina*]; Popov (in Uvarov and Popov (1957)): 379; Hollis 1968: 343, fig. 84; Wranik 1998: 171; Wranik 2003: 324, plates 153, 158; Hemp and Rowell 2020: 119.

Diagnostic notes. *Aiolopus thalassinus* is the only representative of the genus in the Archipelago. Its habitus is slender, with long wings and slender femora and its general colouration varies from green through brown, with markings of all shades of brown to whitish. The pronotum is weakly saddle-shaped and has a contrasting pattern of two white incurved lines bordered by dark markings, suggesting the presence of two lateral carinae (but they are absent) (Fig. 67). The hind wings are hyaline with a greenish hue, slightly infumated in the apex and posterior margin.

Taxonomic notes. Hollis (1968) revised the genus *Aiolopus* Fieber, 1853, distinguished seven species and provided a key. Since his revision, five extra species have been described (Cigliano et al. 2024a), amongst which *Aiolopus puissanti* Defaut, 2005, a cryptic species resembling *A. thalassinus*. *Aiolopus puissanti* mainly occurs around the Mediterranean, but has recently been confirmed for Arabia, namely in Qatar (Defaut 2021). *Aiolopus puissanti* can be separated from *A. thalassinus* by the shape of a dark

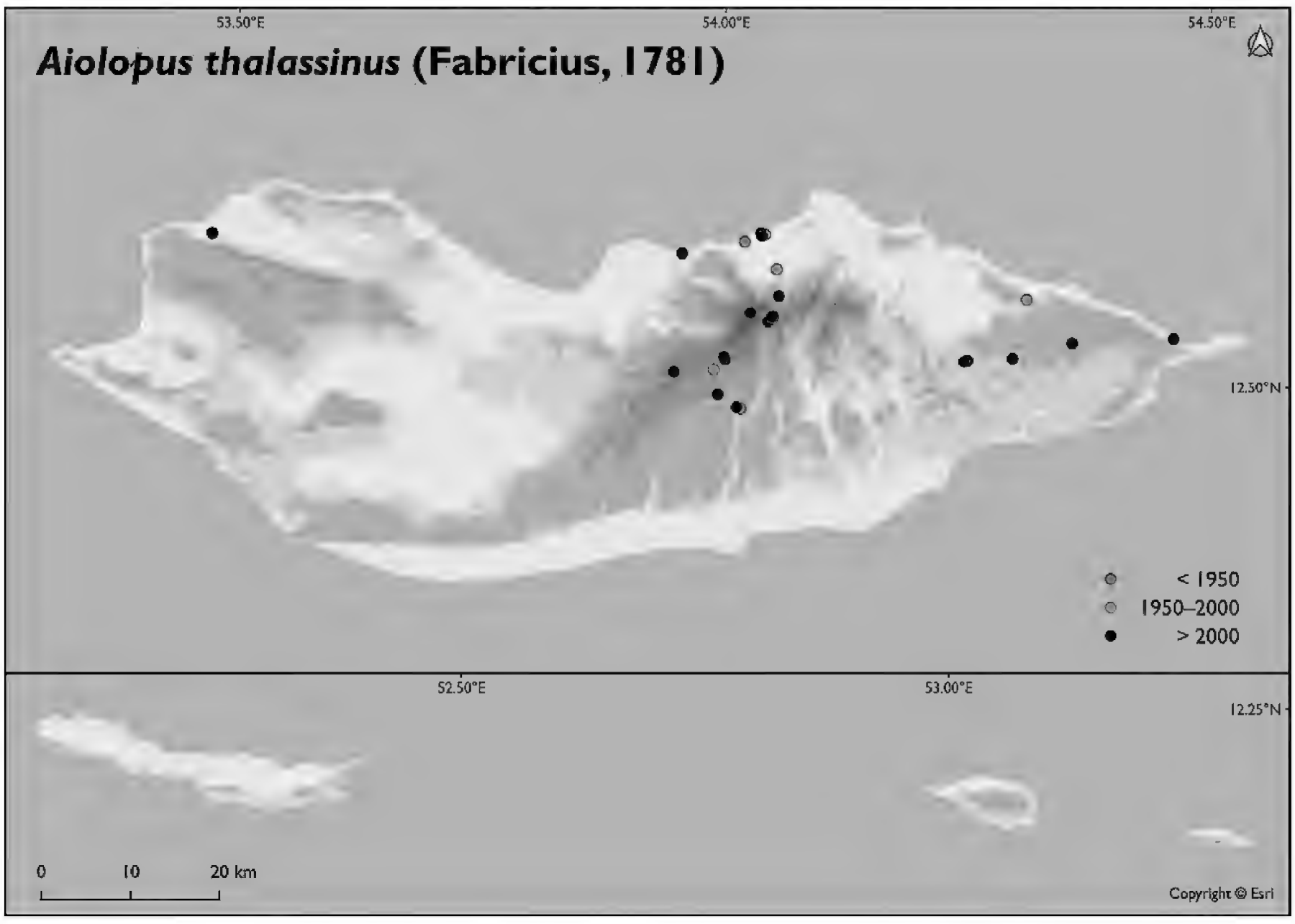

Figure 68. Distribution of *Aiolopus thalassinus* (Fabricius, 1781) in the Socotra Archipelago.

marking on the tegmen: the dark transverse band in the tegmen situated at the level of the apex of the medial field is shallow. It does not extend caudally into the medial field when seen with open tegmen. It is much broader than high. In *A. thalassinus*, this transverse band is almost as broad as high. It penetrates from the frontal ridge caudally well into the medial field and, consequently, is almost square (Defaut and Jaulin 2008; Defaut 2021). Furthermore, in *A. puissanti*, the tegmina extend much further beyond the hind knee (≥ 4.3 mm in males, ≥ 6.0 mm in females) than in *A. thalassinus* (≤ 4.2 mm in males, ≤ 5.5 mm in females) (Defaut 2021). See Defaut and Jaulin (2008) and Defaut (2021) for illustrations of the wing patterns in both species and morphometric values for other parameters.

Hollis (1968) identified the taxon present on Socotra as the nominate ssp. of *Aiolopus thalassinus*. However, based on the shape of the dark marking on the tegmen, the material examined is quite variable. Some are typical for *A. thalassinus* or *A. puissanti*, while others show an in-between pattern. Based on the length of the tegmina extending beyond the hind knees in both males and females and the ratio of eye length to the length of the subocular furrow in females, *Aiolopus* specimens from Socotra identify as *A. thalassinus* (Table 4). However, the value of the latter parameter for males points towards *A. puissanti*, as does the value for the eye length ratio to the interocular space width (Table 4). Since the wing pattern is variable and not decisive in the Socotra specimens and wing length is considered one of the essential distinguishing parameters between the two species, we tentatively consider the taxon on Socotra to be *A. thalassinus*.

A thorough future molecular study of both *Aiolopus* species should give more insight into their status and the exact world distribution of both taxa.

Distribution and occurrence. *Aiolopus thalassinus* is widely distributed in Europe, Africa and western Asia. On Socotra, it is widely distributed, but restricted to sites with suitable habitat, from Qalansiyah in the west to Arher in the east (Fig. 68). It is an abundant species on many sites, for example, in Wadi Zerig, Qeysoh and Adho Dimello.

Habitat and biology. *Aiolopus thalassinus* is a phytophilous species that occurs in grassy vegetation along streams (Popov in Uvarov and Popov (1957)). In 2009 and 2010, the species was numerous in moist, grassy areas in wadis and wetlands, from 0–1450 m a.s.l. It may also be widely abundant in grazed fields and agricultural settings such as those that occur near villages. Records are from all seasons.

Table 4. Morphometrics of *Aiolopus thalassinus* (Fabricius, 1781) from Socotra. Data are from various locations on Socotra. Given are mean values, with minimal and maximal values between brackets.

Specimen	Length tegmen extending beyond the hind knee (mm)	Ratio length eye/length subocular furrow	Ratio length eye/width interocular space
Male (n = 11)	4.0 (3.0–4.9)	2.0 (1.9–2.2)	1.2 (1.1–1.3)
Female (n = 19)	5.0 (4.0–6.5)	1.5 (1.4–1.7)	2.1 (2.0–2.3)

Bioacoustics. Members of the genus *Aiolopus* emit quiet, buzzing sounds during rivalry, courtship and flight (Roesti and Keist 2009). On Socotra, sounds have not been recorded.

Oedaleus senegalensis (Krauss, 1877)

Figs 69–71

References for Socotra. Burr 1903: 412, 418; Popov (in Uvarov and Popov (1957)): 378; Ritchie 1981: 87, fig. 160; Wranik 2003: 324, plate 156.

Figure 69. *Oedaleus senegalensis* (Krauss, 1877), male in its habitat. Wadi Dineghen, Socotra, 30 Oct 2010 (photograph Rob Felix).

Figure 70. *Oedaleus senegalensis* (Krauss, 1877), male and female. **A.** Male; **B.** Female. Wadi Dineghen, Socotra, 30 Oct 2010 (photograph Robert Ketelaar).

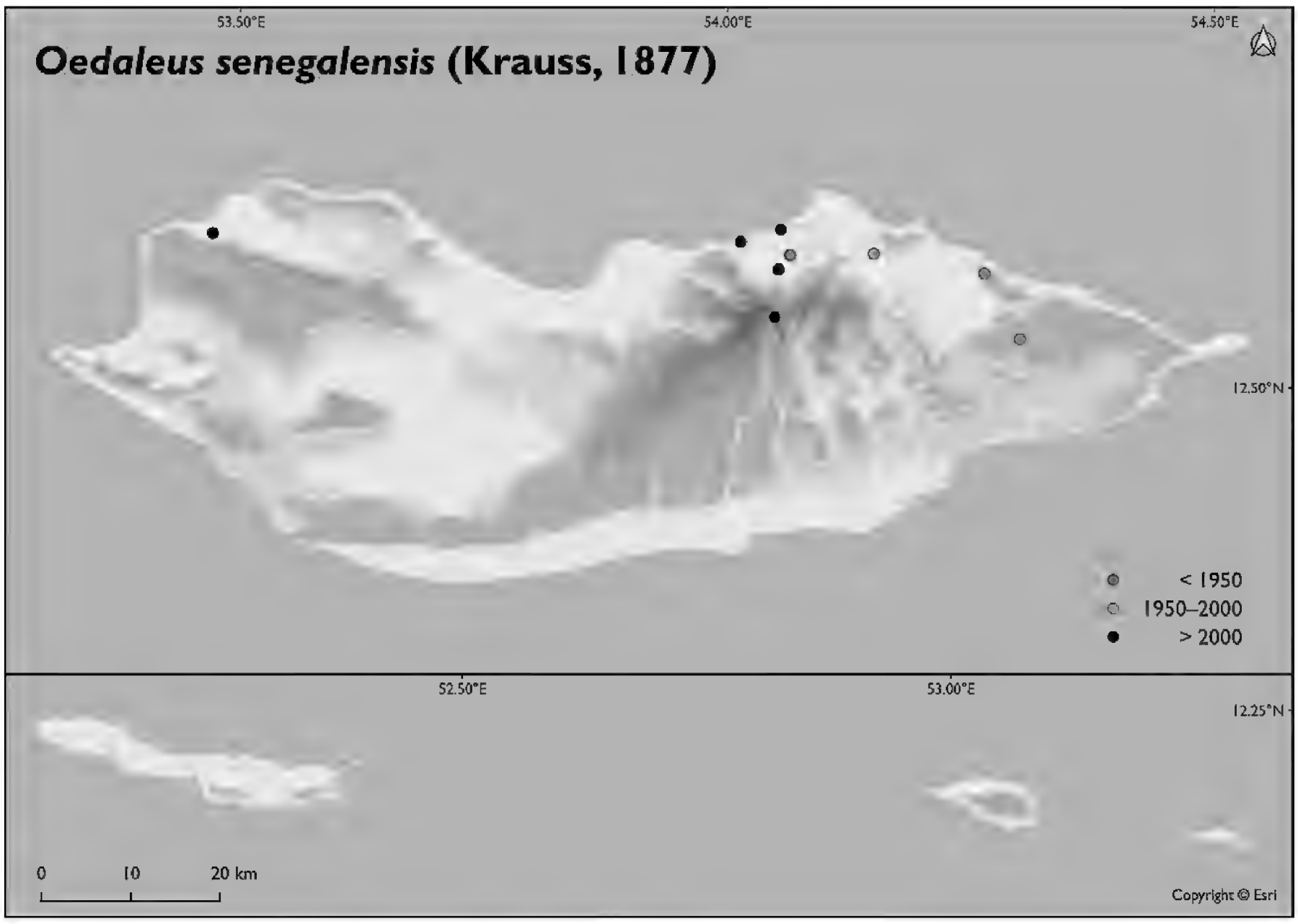

Figure 71. Distribution of *Oedaleus senegalensis* (Krauss, 1877) in the Socotra Archipelago.

Diagnostic notes. *Oedaleus senegalensis* is a primarily greenish or light brown, sizeable Oedipodine grasshopper with long wings (Figs 69, 70). The pronotum is tectiform, slightly saddle-shaped, with light markings forming an open X. The basal two-fifths of the tegmina are dark brown, transversed with a clear pale band. The distal half is primarily clear with darker cells and blackish veins. The basal half of the hind wing is yellowish, at the tip hyaline, with a narrow black fascia, forming a (nearly) complete band, not reaching the posterior margin of the wing.

Ritchie (1981) revised the genus *Oedaleus* Fieber, 1853 and identified the taxon present on Socotra as *Oedaleus senegalensis*.

Distribution and occurrence. The species occurs from the Canary Islands and West Africa through Sub-Saharan Africa to Arabia, western Russia and south-western India. On Socotra, it is known to occur on several sites scattered over the island (Fig. 71).

Habitat and biology. *O. senegalensis* is, like other members of the genus, a geophilous and graminivorous species occurring on dry savannah grasslands (Hemp and Rowell 2020). On Socotra, it has been found in short, grassy vegetation and on bare ground on the coastal plain (Popov in Uvarov and Popov (1957)). Records are from the lower parts of the island from 10–500 m a.s.l. in sparse dwarf shrubland and low *Croton-Jatropha* shrubland. In 2009 and 2010, we found the species at only two sites: at Qeysoh and in the low hills where Wadi Dineghen flows into Hadiboh Plain. Both sites are characterised by bare ground alternated with sparse and low vegetation. Records are from all seasons.

Bioacoustics. The related *Oedaleus decorus* (Germar, 1825) emits quiet, rattling sounds during flight. During rivalry, buzzing sounds are emitted. Courtship consists of 0.5–1.1 s sounds, emitted with irregular intervals (Roesti and Keist 2009). On Socotra, sounds emitted by *O. senegalensis* have not been recorded.

Scintharista forbesii (Burr, 1899)

Figs 72–75

References for Socotra. Burr 1899b: 44–45; [as *Dissosteira forbesii*]; Burr 1903: 412, 413, 418–419, plate XXV: fig. 1 [as *D. forbesii*]; Krauss 1907: 17, 19, 29,

Figure 72. *Scintharista forbesii* (Burr, 1899), male. Wadi Zerig, Socotra, 27 Feb 2009 (photograph Robert Ketelaar).

plate II: figs 2, 2A [as *Quiroguesia forbesii* (sic)]; Popov (in Uvarov and Popov (1957)): 379; Wranik 1998: 171; Wranik 2003: 324, plates 153, 156.

Diagnostic notes. *Scintharista forbesii* is an unmistakable member of the genus *Scintharista* Saussure, 1884. It is the only species with the basal two-thirds of the hind wings inky black (Fig. 73). The distal one-third of the hind wings is transparent, except for an infumated top. Hind tibiae are red in the distal half.

Taxonomic notes. Burr (1899b) named this remarkable species after Dr H.O. Forbes, director of the Liverpool Museum, who led the zoological expedition to Socotra together with Mr W.R. Ogilvie-Grant of the British Museum in 1889 and 1899.

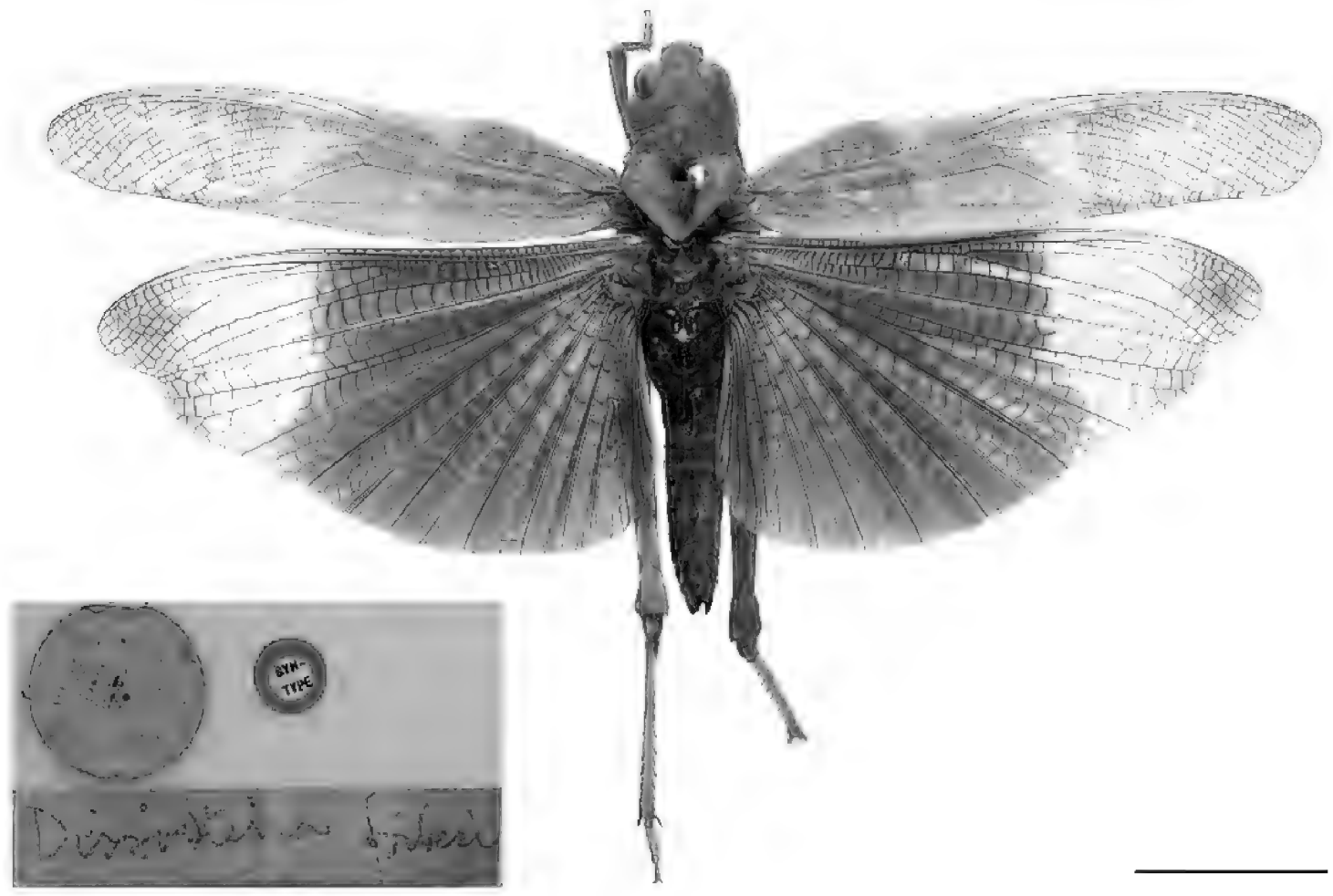

Figure 73. *Scintharista forbesii* (Burr, 1899), male, syntype. Collected by Forbes & Ogilvie-Grant at Homhil, Socotra, 22 Jan 1899. Scale bar: 1 cm (photograph Rob Felix).

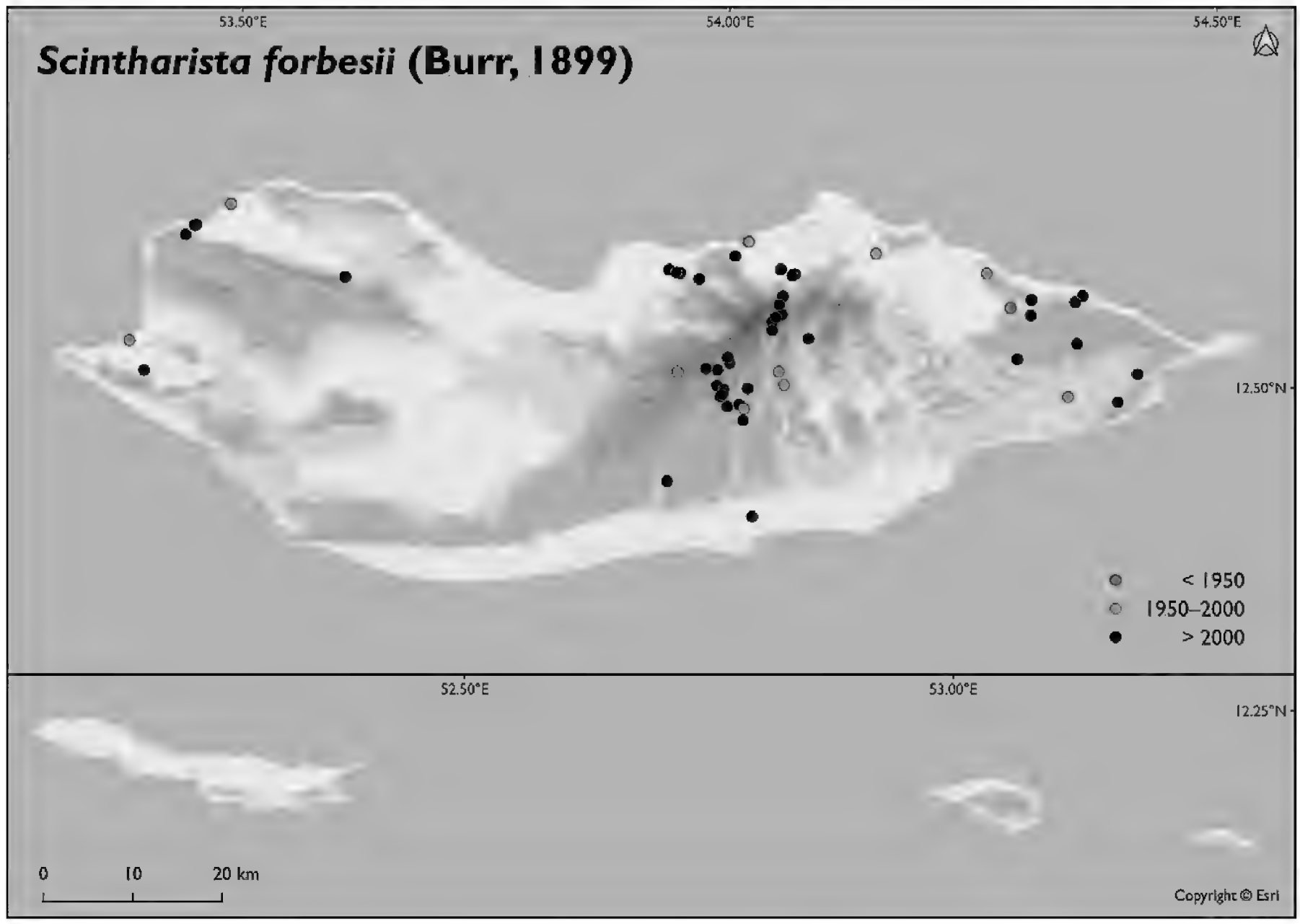

Figure 74. Distribution of *Scintharista forbesii* (Burr, 1899) in the Socotra Archipelago.

Figure 75. *Scintharista forbesii* (Burr, 1899), male in its habitat. Zerig, Socotra, 21 Feb 2009 (photograph Robert Ketelaar).

Distribution and occurrence. *Scintharista forbesii* is endemic to Socotra, where it is widespread and locally common (Fig. 74). It is found mainly in the Hagher and limestone plateaus, but also on sea-level plains.

A record from Abd el Kuri, collected in January 1899 by Simony, mentioned by Kraus (1907), is not referred to in subsequent literature. This specimen could not be found in the collection in Vienna (H. Bruckner, NMW in litt.). The record has been omitted from the map in Fig. 74.

Habitat and biology. *S. forbesii* favours dry, open habitats from 10–1000 m a.s.l., mostly on coarse gravel, large boulders and bare rock in high shrubland with succulents, submontane grassland and shrubland, also on boulders in more wooded areas (montane mosaic, Frankincense woodland and forest). Records are from all seasons; nymphs are recorded in January, February and August.

Bioacoustics. *S. forbesii* gives distinct flight crepitations when disturbed, similar to its relative *S. notabilis* (Walker, 1870) (see species account *S. notabilis*). The sound of *S. forbesii* has not been recorded. Members of the Oedipodinae subfamily are known to emit quiet, buzzing sounds during rivalry, courtship and flight (Roesti and Keist 2009).

Scintharista notabilis (Walker, 1870)

Figs 76, 77

References for Socotra. Guichard 1992: 186 [as *Schintharista* [sic] *notabilis*]; Wranik 2003: 324, plate 156.

Diagnostic notes. *Scintharista notabilis* resembles *S. forbesii* at rest, but in flight, the coloured hind wings are unmistakable. No other taxon in the Archipelago combines a large body size with the following pattern of its hind wing: a yellow to red basal half bordered by a dark fascia of medium width reaching the posterior margin (Fig. 76). The distal part of the wing is transparent, except for a dark apex. Hind tibiae are orange in the distal two-thirds.

The OSF (Cigliano et al. 2024a) distinguishes eight subspecies of *Scintharista notabilis*, of which Uvarov (1941) treats seven, accompanied by a key. The two males with spread wings collected by Guichard on Abd el Kuri show a combination of characters not exactly fitting one of the subspecies in Uvarov's key (Uvarov 1941). They mostly resemble *S. notabilis blanchardiana* (Saussure, 1888), a subspecies known to occur in Arabia (Uvarov 1941; Ingrisch 1999). According to Uvarov (1941), the yellowish colour of the male hind wing does not match the red hind wings of male *blanchardiana*, a feature given only for females (but this is probably variable), nor does the absence of a bluish colour near the anal margin of the hind wing and the relatively narrow dark fascia. The orange colour of the hind tibiae and the banded tegmina are otherwise consistent with the Arabian subspecies.

Figure 76. *Scintharista notabilis* (Walker, 1870), male. Collected on Abd el Kuri by Kenneth Guichard in 1967. Scale bar: 1 cm (photograph Rob Felix).

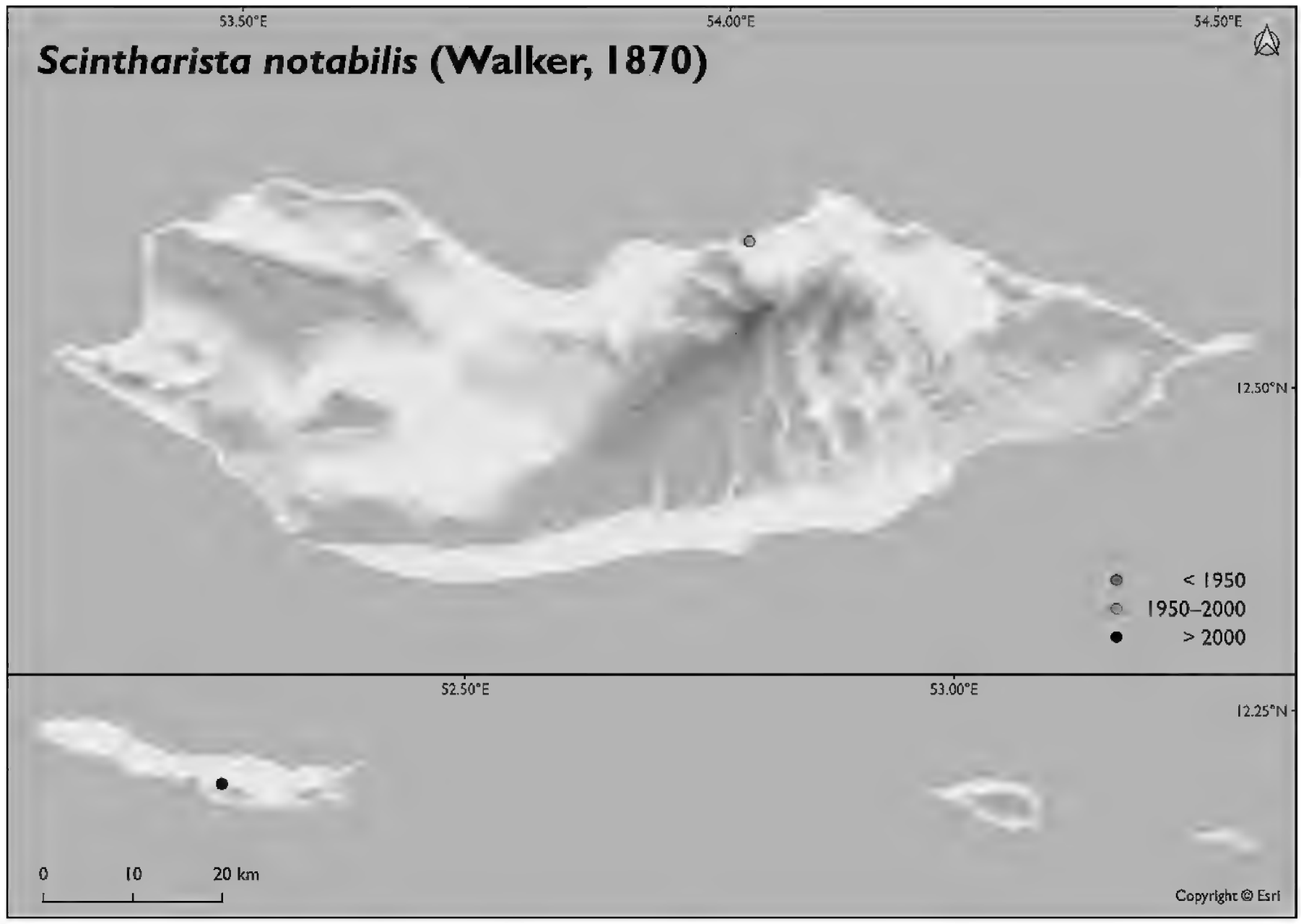

Figure 77. Distribution of *Scintharista notabilis* (Walker, 1870) in the Socotra Archipelago.

Distribution and occurrence. *S. notabilis* is widespread in Africa and Southwest Asia. It occurs on Abd el Kuri and potentially on Socotra. The specimen collected by Wranik at Hadiboh, Socotra, in 1984 is the only record known from the island. As *S. notabilis* is a rather conspicuous species with red or yellow wings, it is remarkable that it has not been recorded during other explorations on Socotra. Therefore, the sole record at Hadiboh, the island's main town, may represent a stowaway, vagrant or a case of mislabelling. Natural vagrants, if occurring, could be searched for on the western coastline of Socotra.

Three specimens collected by Guichard in 1967 on Socotra (Hadiboh Plain, Hamadero, Kalansiya), placed in a draw between *S. notabilis* in the collection in NMHUK, are identified as *S. forbesii*, based on the darker colour, especially the distal half of the tegmina. The wings are closed, so it is difficult to identify the wing colour. Guichard (1992) only mentioned Abd el Kuri as a collecting site of *S. notabilis*.

Habitat and biology. For a description of the habitat at the northern slopes of Jebel Saleh, see the species account of *Sphingonotus albipennis* Krauss, 1902. Remarkably, Guichard did not collect this species, which must have been present on the site where he collected *Scintharista notabilis* and *Heteracris annulosa*.

Bioacoustics. The only song known to us is a series of up to about 20 very short clicks. Clicks are repeated at the rate of about 12/s and show a frequency spectrum between 5 and 20 kHz (e.g. Baudewijn Odé, XC786780, accessible at https://www.xeno-canto.org/786780).

Sphingonotus (*Neosphingonotus*) *canariensis* Saussure, 1884

Fig. 78

References for Socotra. Popov (in Uvarov and Popov (1957)): 376; Wranik 1998: 171; Wranik 2003: 323, plate 157.

Diagnostic notes. *Sphingonotus* (*N.*) *canariensis* is the only member of the subgenus *Neosphingonotus* Benediktov, 1998, present in the Archipelago. Thickened cross veinlets between the radial and medial veins in the tegmina characterise the subgenus. The intercalary and radial veins are not serrated. The supra-anal plate is triangular or rounded (Husemann et al. 2011).

S. canariensis is a somewhat darker- and uniformly coloured, brownish member of the genus with broad, coarse bands on the tegmina. The hind wings are hyaline and characterised by a narrow complete dark fascia continuing on the anal fan, a feature lacking in other *Sphingonotus* species in the Archipelago, apart from *Sphingonotus* (*S.*) *balteatus* (Serville, 1838), which has very broad fasciae and a violet base of the hind wing (Fig. 88). *Sphingonotus* (*S.*) *insularis* (Popov, 1957) has short dark fasciae not covering all anal veins in the basally bluish hind wing and a unique habitus, very different from *S. canariensis* (see species account *S. insularis*).

Distribution and occurrence. The type locality of *Sphingonotus* (*Neosphingonotus*) *canariensis* is considered Cape Verde (Huseman 2020). *S. canariensis* is wide-

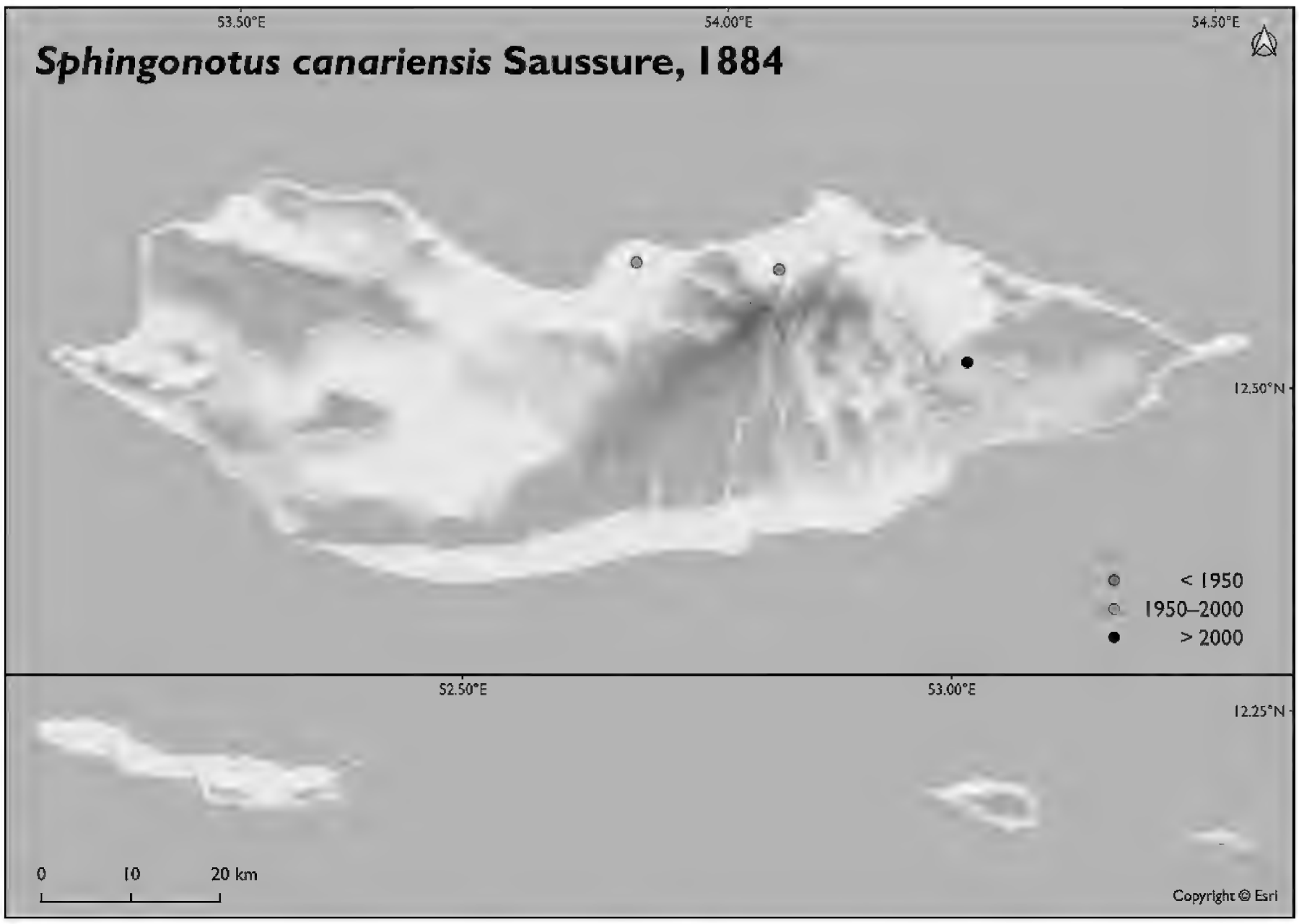

Figure 78. Distribution of *Sphingonotus* (*Neosphingonotus*) *canariensis* Saussure, 1884 in the Socotra Archipelago.

spread in northern Africa, reaching Kenya in the south and parts of the Arabian Peninsula (Huseman 2020). On Socotra, the taxon is apparently rare (or under-recorded) and only collected on two sites in 1953 by Popov and on one site by us in 2010 (Fig. 78).

Habitat and biology. All collecting sites are open, gravelly plains with low *Croton-Jatropha* shrubland. RAF Camp and Hadiboh Plain are around 25 m a.s.l. and Wadi Shilhin is at 281 m a.s.l. Records are from January, April and December.

Bioacoustics. Members of the Oedipodinae subfamily are known to emit quiet, buzzing sounds during rivalry, courtship and flight (Roesti and Keist 2009). The sound of this species is unknown.

Figure 79. *Sphingonotus* (*Parasphingonotus*) *turkanae* Uvarov, 1938, male. Momi Plateau, Socotra, 2 Nov 2010 (photograph Robert Ketelaar).

Sphingonotus (*Parasphingonotus*) *turkanae* Uvarov, 1938

Figs 79–81

References for Socotra. Popov (in Uvarov and Popov (1957)): 376; Wranik 1998: 171; Wranik 2003: 323, plates 152, 157; Husemann et al. 2011: 57–59.

Diagnostic notes. The subgenus *Parasphingonotus* Benediktov & Husemann, 2009 is characterised by a serrated radial vein that is raised above the subcostal vein. Thickened cross veinlets between the radial and medial veins are absent (Husemann et al. 2011). *Sphingonotus* (*P.*) *turkanae* is a relatively small member of the genus (Figs 79, 81), lacking a dark fascia in the hind wings, with a short, strongly trilobate supra-anal plate with raised tubercles (Husemann et al. 2011).

Distribution and occurrence. The type locality of *Sphingonotus* (*P.*) *turkanae* is Lake Turkana in Kenya. The species is restricted to eastern Africa (Ethiopia, Somalia, Kenya, Tanzania) and Yemen, including Socotra (Fig. 80) (Husemann et al. 2011). Husemann (2020) mentioned only Ethiopia, Tanzania and Kenya.

Habitat and biology. On Socotra, the species can be found in various habitats between 5 and 500 m a.s.l., mostly in sparse dwarf shrubland, low *Croton-Jatropha* shrubland and submontane grassland. At Taaqs, it was found on a fine, gravelly plain with grassy vegetation (Fig. 4), at

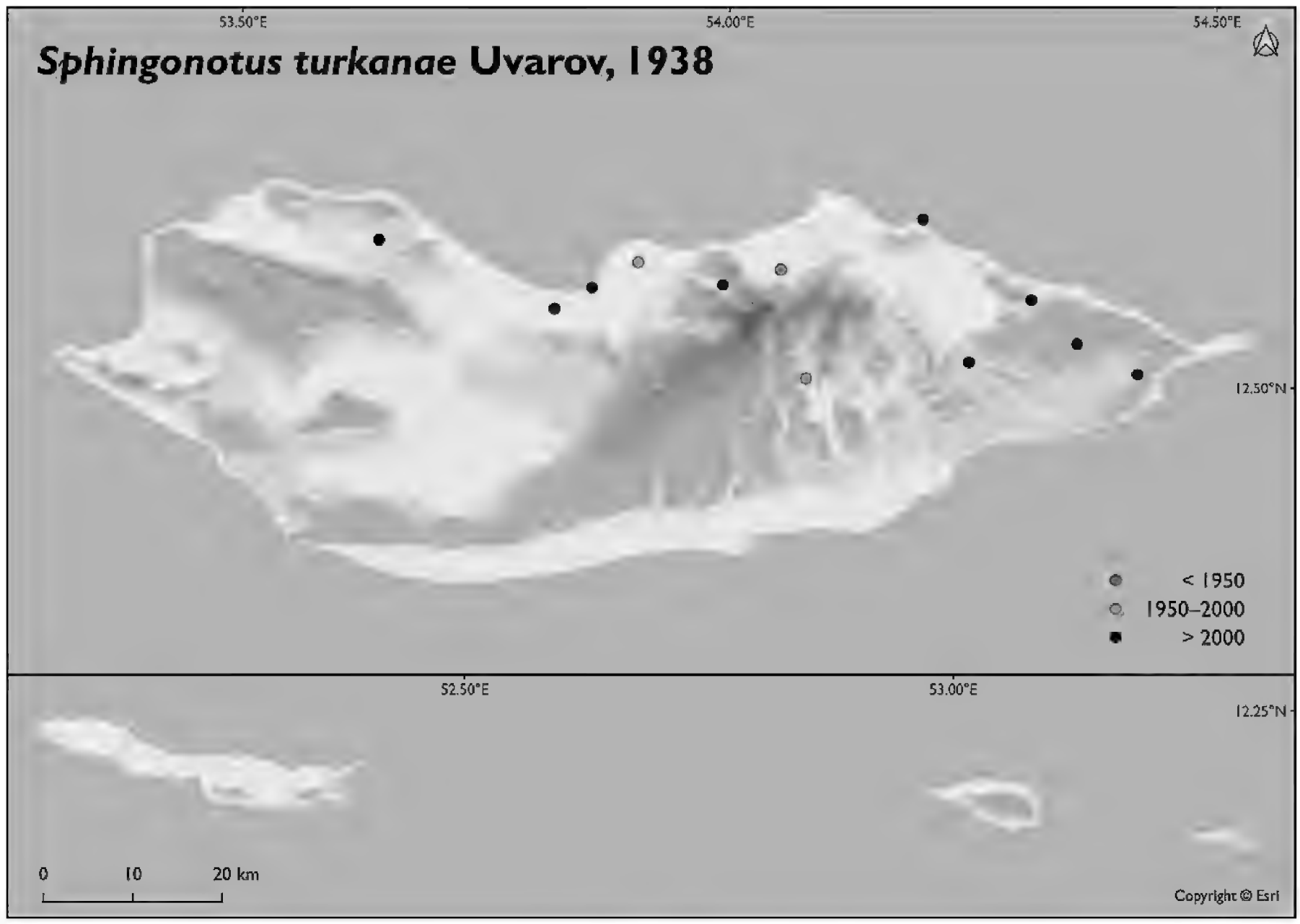

Figure 80. Distribution of *Sphingonotus* (*Parasphingonotus*) *turkanae* Uvarov, 1938 in the Socotra Archipelago.

Figure 81. *Sphingonotus* (*Parasphingonotus*) *turkanae* Uvarov, 1938, male in its habitat. Wadi Ayhaft, Socotra, 26 Oct 2010 (photograph Rob Felix).

Figure 82. *Sphingonotus* (*S.*) *albipennis* Krauss, 1902, male. Abd el Kuri, 21 Oct 2022 (photograph Pierre van der Wielen).

Dehamd on a coastal plain and at Ayhaft on gravelly soils in a Frankincense forest. Records are from all seasons.

Bioacoustics. Members of the Oedipodinae subfamily are known to emit quiet, buzzing sounds during rivalry, courtship and flight (Roesti and Keist 2009). The sound of this species is unknown.

Sphingonotus (*S.*) *albipennis* Krauss, 1902

Figs 82–87

References for Socotra. Krauss 1902: 4; Burr 1903: 412, 424 [as *Sphingonotus caerulans*]; Krauss 1907: 17, 20, plate II: fig. 3; Mistshenko 1937: 157; Uvarov (in Uvarov and Popov (1957)): 376; Wranik 2003: 323, plate 157.

Diagnostic notes. In the subgenus *Sphingonotus* Fieber, 1852, the intercalary vein in the medial area of the tegmen is serrated. In females, it is only slightly serrated or smooth (Husemann et al. 2011).

Uvarov (in Uvarov and Popov (1957)) stated that *S.* (*S.*) *albipennis* (Figs 82, 83) is very close to *S.* (*S.*) *savignyi* Saussure, 1884 and that the only difference is the missing dark band in the hind wings of *albipennis*, which is present in *savignyi*. However, *S. albipennis* can have a faint dark wing band (Fig. 84) (see also Mistshenko (1937)). The hind wings are whitish/hyaline, not bluish, as Wranik (2003) stated. Another difference is that in *S. albipennis*, the inner sides of the hind femora are yellow with three dark bands. *S. savigny* has entirely yellow inner sides of the hind femora, except for one dark band.

Furthermore, *S. albipennis* is a much smaller species than *savigny*. Differences with *Sphingonotus* (*S.*) *ganglbaueri* Krauss, 1907, occurring on Socotra and Samha Is. are as follows: *Sphingonotus albipennis* has an obtusely-angled posterior margin of the pronotum, longer hind femora and a sloping head seen from the side. In *S. ganglbaueri*, the posterior margin of the pronotum is acutely angled, the head has a straight profile seen from the side and the hind femora are much shorter. The hind wings often have a trace of a smoky dark band and are bluish at its base.

Taxonomic notes. *Sphingonotus* (*S.*) *albipennis* has been described and re-described by Krauss (1902; 1907), based on specimens collected by Simony on Abd el Kuri between 17 and 22 January 1899 (Fig. 83). During two visits of Forbes

Figure 83. *Sphingonotus* (*S.*) *albipennis* Krauss, 1902, male, syntype. Collected by Simony on Abd el Kuri in 1899. Scale bar: 1 cm (photograph Rob Felix).

Figure 84. *Sphingonotus* (*S.*) *albipennis* Krauss, 1902, male. Collected by Forbes and Ogilvie-Grant on Abd el Kuri, 22 Feb 1899 and erroneously identified by Burr (1903) as *S. caerulans* (Linnaeus, 1767). Scale bar: 1 cm (photograph Rob Felix).

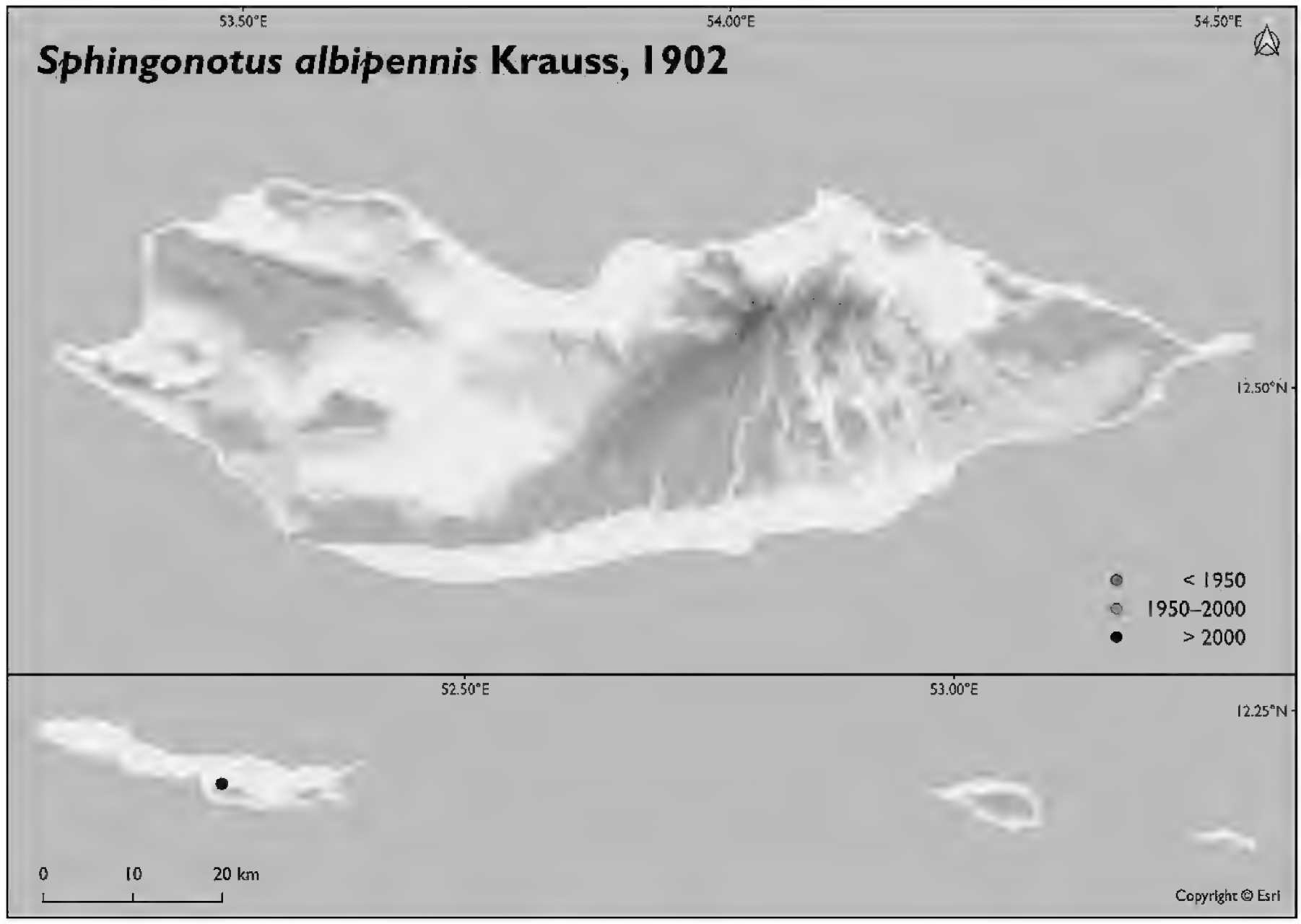

Figure 85. Distribution of *Sphingonotus* (*S.*) *albipennis* Krauss, 1902 in the Socotra Archipelago.

Figure 86. Habitat of *Sphingonotus* (*S.*) *albipennis* Krauss, 1902 on Abd el Kuri. With *Euphorbia abdelkuri* (photograph Pierre van der Wielen).

Figure 87. Habitat of *Sphingonotus* (*S.*) *albipennis* Krauss, 1902. Northern slopes of Jebel Saleh, Abd el Kuri with *Euphorbia abdelkuri* (photograph Pierre van der Wielen).

and Ogilvie-Grant to Abd el Kuri (3–6 Dec 1898 and 22–25 Feb 1899), they also collected *S. albipennis*, but Burr (1903) misidentified those specimens as *S. caerulans* (Linnaeus, 1767) (Fig. 84) (Uvarov in Uvarov and Popov (1957)).

Material collected during the Forbes expedition to the Archipelago in 1898 and 1899 processed at that time in London (NHMUK) bears the label "Sokotra 1900-234". Material collected on the island of Abd el Kuri also bears that label (see earlier in this paper). For this reason, Mistshenko (1937), who identified Burr's specimens correctly as *S. albipennis*, erroneously consid-

ered those specimens as collected on Socotra in the year 1900 (Uvarov in Uvarov and Popov (1957)). The material from the Forbes expedition processed in Liverpool has been labelled correctly and bears a label with Abd el Kuri as the collecting site.

Distribution and occurrence. *Sphingonotus* (*S.*) *albipennis* is endemic to Abd el Kuri Is (Fig. 85). Mistshenko (1937) erroneously mentioned the species to occur on Socotra.

A rough idea of where Simony and Forbes and Ogilvie-Grant collected *S. albipennis* on Abd el Kuri in 1898 and 1899 can be determined from Rebel (1907) and Forbes (1903), respectively. According to Rebel (1907), the collecting events by Simony on Abd el Kuri were primarily on Jebel Saleh and Cimali. These two mountains are only accessible from the northern plains and slopes, their southern slopes being steep, inaccessible cliffs.

In Forbes (1903), it can be read that, on 5 Dec 1898, the collecting party went up Jebel Saleh through its north-western slope, departing from base camp at a sandy beach at the foot of the mountain southwest of it, known as Bandar Saleh. The specimens collected on 22 Feb 1899 were also encountered very close to Bandar Saleh (Forbes 1903).

During a trip in 2022, several individuals were observed mainly on the plain north of Jebel Saleh and the adjacent northern slopes (P. van der Wielen, in litt.). Based on this information, the plains near Jebel Saleh and its slopes may have been the only known collecting sites of this Abd el Kuri endemic over the years. The exact collecting sites of Wranik's specimens are unknown to us.

Habitat and biology. In 2022, the species was observed on the plains north of Jebel Saleh and its slopes, especially on stony sites covered by small rocks and scattered stands of *Euphorbia abdelkuri* (Figs 86, 87) (P. van der Wielen, in litt.). Records of the species are from December–March.

Bioacoustics. Members of the Oedipodinae subfamily are known to emit quiet, buzzing sounds during rivalry, courtship and flight (Roesti and Keist 2009). The sound of this species is unknown.

Sphingonotus (*S.*) *balteatus* (Serville, 1838)

Fig. 88

References for Socotra. Burr 1903: 412, 424 [as *Sphingonotus savignyi*]; Uvarov (in Uvarov and Popov (1957)): 376 [as *S. savignyi*].

Diagnostic notes. *Sphingonotus* (*S.*) *balteatus* is a large species with unmistakably coloured hind wings: basally violet or purple with an extensive black fascia and a hyaline apex (Fig. 88).

Distribution and occurrence. *Sphingonotus balteatus* is found in Egypt and Somalia, eastwards, through Arabia, into Pakistan and India (Husemann 2020).

Burr (1903) mentioned a specimen of *S. savignyi* collected by the Forbes expedition on Abd el Kuri on 5 December 1898. Uvarov (in Uvarov and Popov (1957)) was unable to trace that specimen in the London and the Liverpool collections and expected Burr to have been misled by a dark specimen of *S. albipennis*. We found one specimen of *Sphingonotus* (*Sphingonotus*) *balteatus* between congeners in a drawer in the NHMUK, labelled as *savigny* bearing the label "Sokotra 1900-234" (Fig. 88). This label indicates it was collected during Forbes' expedition to Socotra and Abd el Kuri in 1889 and 1899 and it does not mean the specimen was collected on Socotra itself. We conclude this must be the specimen collected by Forbes and Ogilvie-Grant on Abd el Kuri, mentioned by Burr (1903). Since *S. balteatus* differs markedly from *S. savignyi*, we cannot explain Burr's misidentification.

In the Socotra Archipelago, it has only been found once on Abd el Kuri Is. (Fig. 89). Since the specimen was collected on 5 Dec 1898, the day the party went up Jebel Saleh (Forbes 1903), it is assumed that the collecting site is the same as that of *S. albipennis* collected that day (see species account *S. albipennis*).

Habitat and biology. The habitat on Abd el Kuri is expected to be the same as that of *S. albipennis*.

Bioacoustics. Members of the Oedipodinae subfamily are known to emit quiet, buzzing sounds during rivalry, courtship and flight (Roesti and Keist 2009). The sound of this species is unknown.

Figure 88. *Sphingonotus* (*S.*) *balteatus* (Serville, 1838), female. Collected by Forbes and Ogilvie-Grant on Abd el Kuri, 5 Dec 1898, erroneously identified by Burr (1903) as *S. savigny* (photograph Rob Felix).

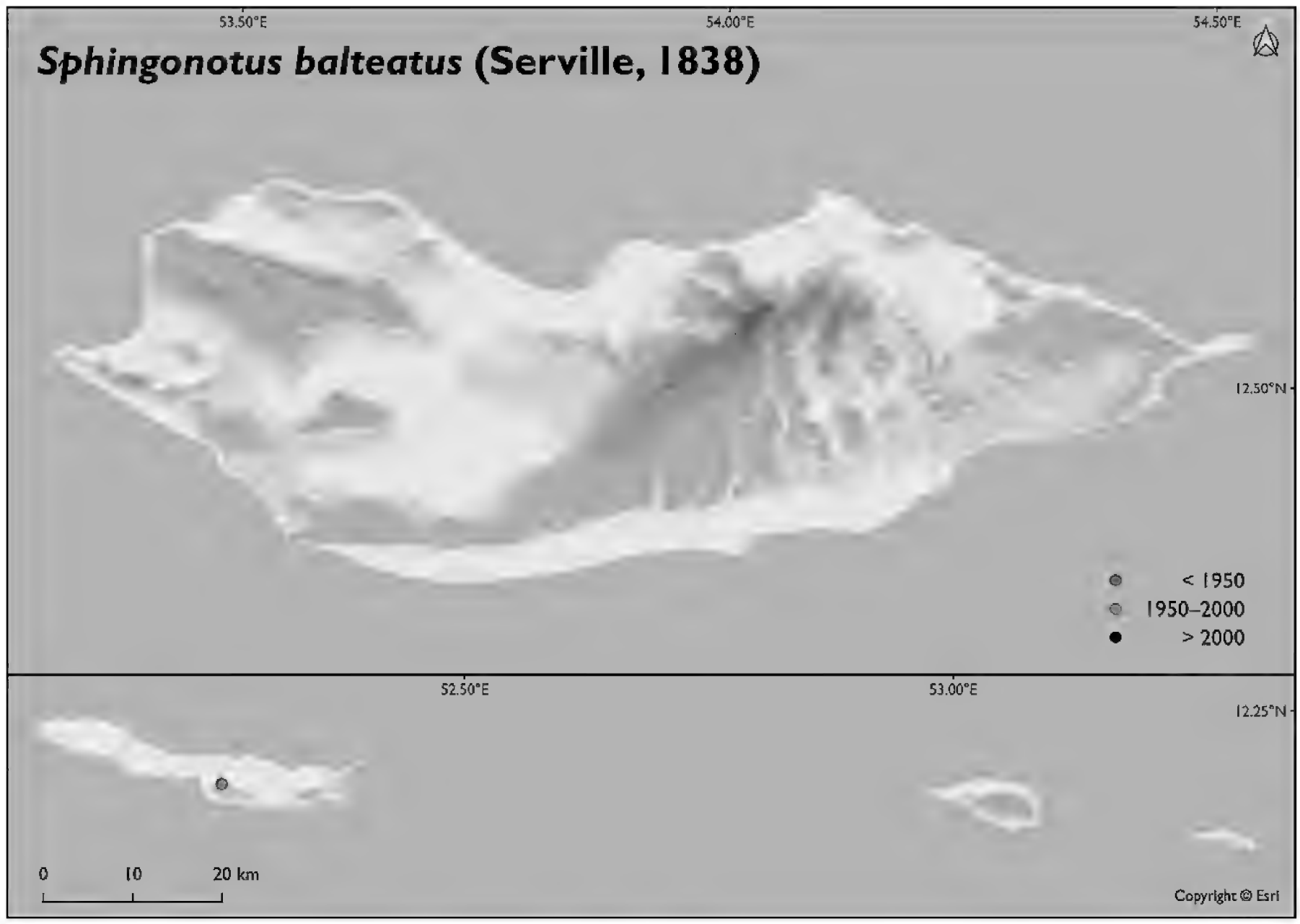

Figure 89. Distribution of *Sphingonotus* (*S.*) *balteatus* (Serville, 1838) in the Socotra Archipelago.

Sphingonotus (*S.*) *ganglbaueri* Krauss, 1907

Figs 90–93

References for Socotra. Krauss 1907: 21, 29, plate II: fig. 4; Mistshenko 1937: 155; Popov (in Uvarov and Popov (1957)): 377; Wranik 1998: 171; Wranik 2003: 323, plates 152, 157.

Diagnostic notes. *Sphingonotus* (*S.*) *ganglbaueri* is often a whitish or pearl-coloured species, characterised by a slender body and an acutely-angled posterior margin of the pronotum. A broad pale medial band on the forewing is often lighter than the overall base colour and contrasts strikingly in darker specimens (Figs 90, 93). Base colouration adapts locally, such as brick-red specimens occurring at Dehamd amongst similarly coloured soils. The hind wings are hyaline with bluish veins, sometimes with a faint, bluish base. There is often a trace of a dark fascia, mainly in males.

Taxonomic notes. Krauss (1907) described *S.* (*S.*) *ganglbaueri*, based on a single male collected on Socotra by Simony in 1899. Mistshenko (1937) re-described the species and Popov (in Uvarov and Popov (1957)) described the female.

Distribution and occurrence. The species is endemic to the Socotra Archipelago and occurs on Socotra and Samha Is. It is widespread and locally common on Socotra, especially on the coastal plains below 70 m a.s.l. (Fig. 91). There are exceptional records up to 700 m a.s.l. (see Popov in Uvarov and Popov (1957)), as in Wadi Dineghen in 1956 and Di Hashus and Betin in 2008. In 2009, it was common at Ditwah Lagoon and on Noged Plain.

Figure 90. *Sphingonotus* (*S.*) *ganglbaueri* Krauss, 1907, male in its habitat. Ditwah Lagoon, Socotra, 28 Feb 2009 (photograph Rob Felix).

Habitat and biology. *S. ganglbaueri* can be found on dry, bare patches of gravelly and sandy soils on the coast in dunes (Fig. 90), sparse dwarf shrubland, low *Croton-Jatropha* shrubland and high shrubland with succulents and, occasionally, in more vegetated areas. It is recorded year-round.

Bioacoustics. The song consists of repeated echemes of 10–20 ticking syllables. Echemes are repeated with intervals of 2–3 s (Fig. 92A). The syllables are very short (< 1 ms) and repeated at about 18 per second (Fig. 92B). Within syllables, the sound is seemingly primarily produced by one moving direction of the hind legs. The frequency spectrum is quite broad, with

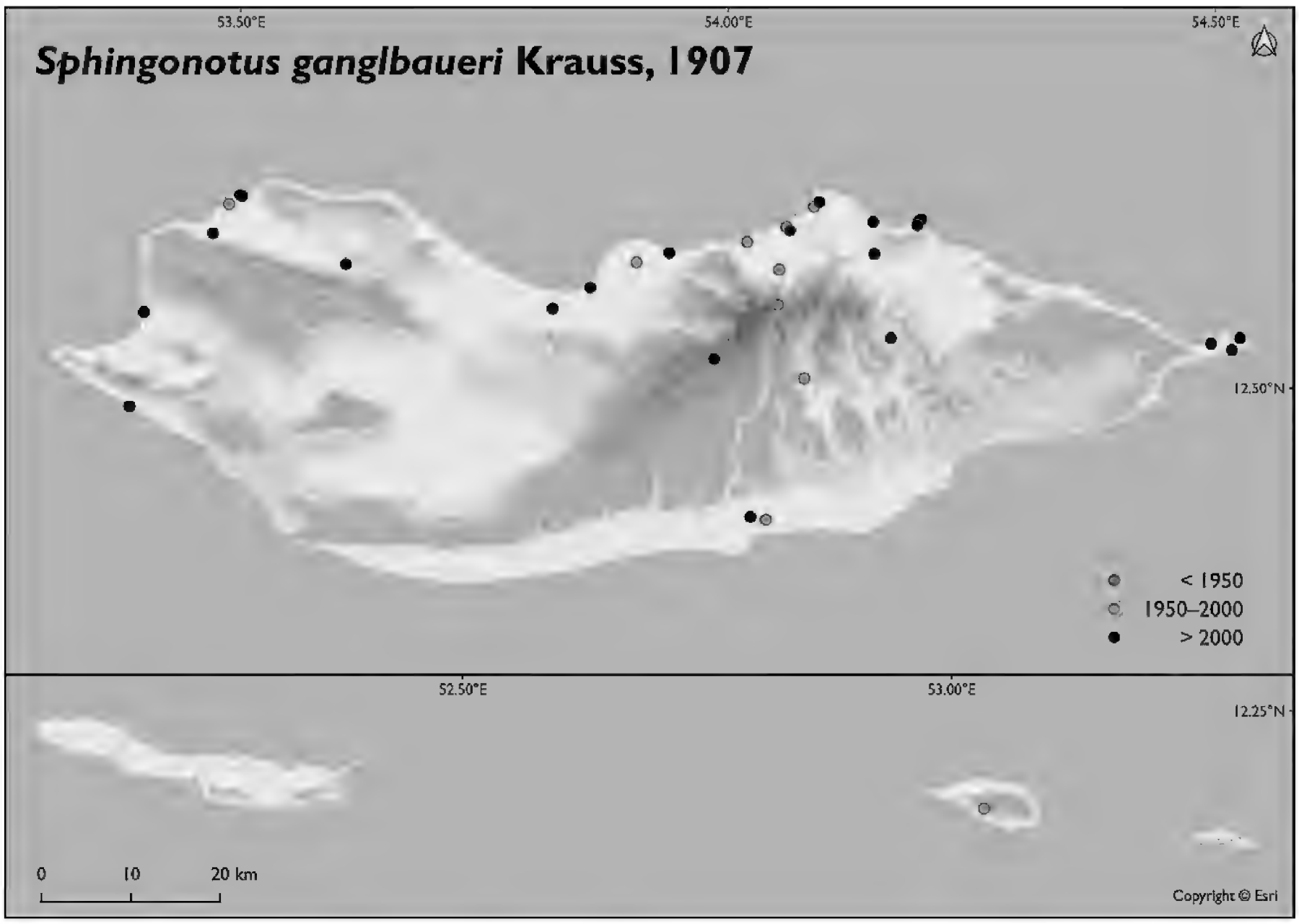

Figure 91. Distribution of *Sphingonotus* (*S.*) *ganglbaueri* Krauss, 1907 in the Socotra Archipelago.

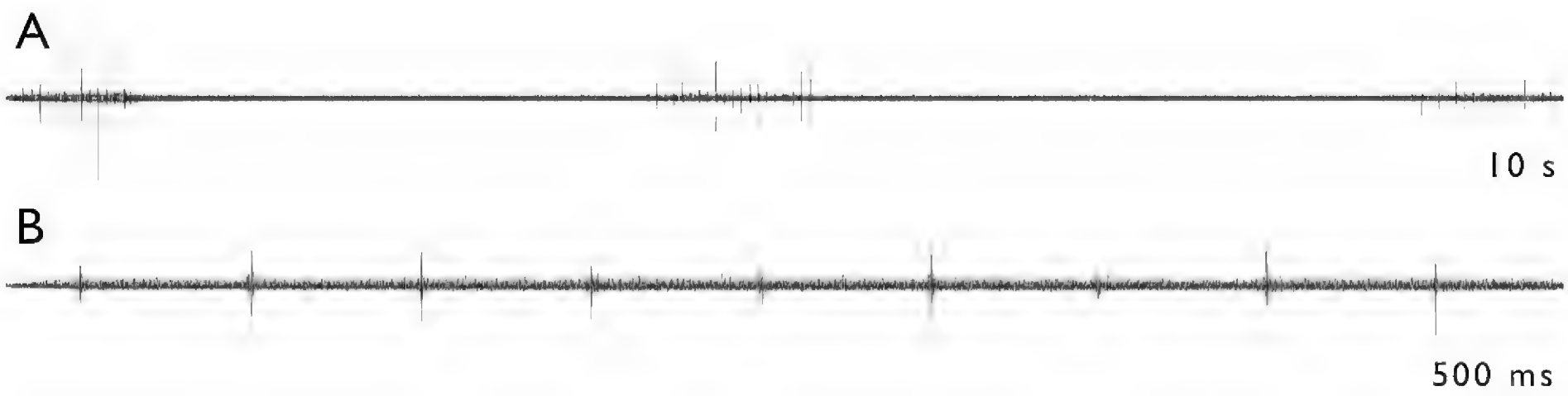

Figure 92. Calling song of *Sphingonotus* (*S.*) *ganglbaueri* Krauss, 1907. Oscillograms depicting 10 s (**A**) and 500 ms (**B**). Ras Momi, Socotra, 3 Nov 2010, 08:07 h; RecRF10191; SpRF10YE109, 110; XC877928, accessible at https://www.xeno-canto.org/877928.

Figure 93. *Sphingonotus* (*S.*) *ganglbaueri* Krauss, 1907, female. Ditwah Lagoon, Socotra, 28 Feb 2009 (photograph Robert Ketelaar).

main frequencies between 4 and 7 kHz (XC877928, accessible at https://www.xeno-canto.org/877928).

Sphingonotus (*Sphingonotus*) *insularis* (Popov, 1957)

Figs 94–99

References for Socotra. Popov (in Uvarov and Popov (1957)): 377–378, figs 24–26 [as *Wernerella insularis*]; Johnsen 1985: 156, 166 [as *W. insularis*]; Wranik 2003: 323–324, plates 152, 157 [as *W. insularis*]; Massa 2009: 57–59, figs 17–19.

Diagnostic notes. *Sphingonotus* (*Sphingonotus*) *insularis* is easy to distinguish from other members of the genus in the Archipelago by the strongly undulated margins of the pronotum, the sudden notch in the dorsal carina of the hind femur close to the knee, the very large meso-

and metasternal interspaces, the microscopic pearls on the tegmen and the stout appearance of the animal (Figs 94, 95) (Massa 2009). The hind wings are basally light blue and have a short, often incomplete band not reaching the hind margin and covering only the first anal veins. This band may sometimes only consist of separate dark spots (Fig. 95). The key in Johnsen (1985) separates *S. insularis* from other species formerly attributed to *Wernerella* by the deep blue supra-anal plate in the males.

Taxonomic notes. Popov (in Uvarov and Popov (1957)) attributed *Sphingonotus* (*S.*) *insularis* (Fig. 95) to the genus *Wernerella* Karny, 1907, known from the Canary Islands and the Moroccan coast and considered it sister to *Sphingonotus asperus* (Brullé, 1840). Hochkirch and Husemann (2008) synonymised *Wernerella* with *Sphingonotus* Fieber, 1852: genetic analyses suggested

Figure 94. *Sphingonotus* (*Sphingonotus*) *insularis* (Popov, 1957), male. Momi Plateau, Socotra, 2 Nov 2010 (photograph Robert Ketelaar).

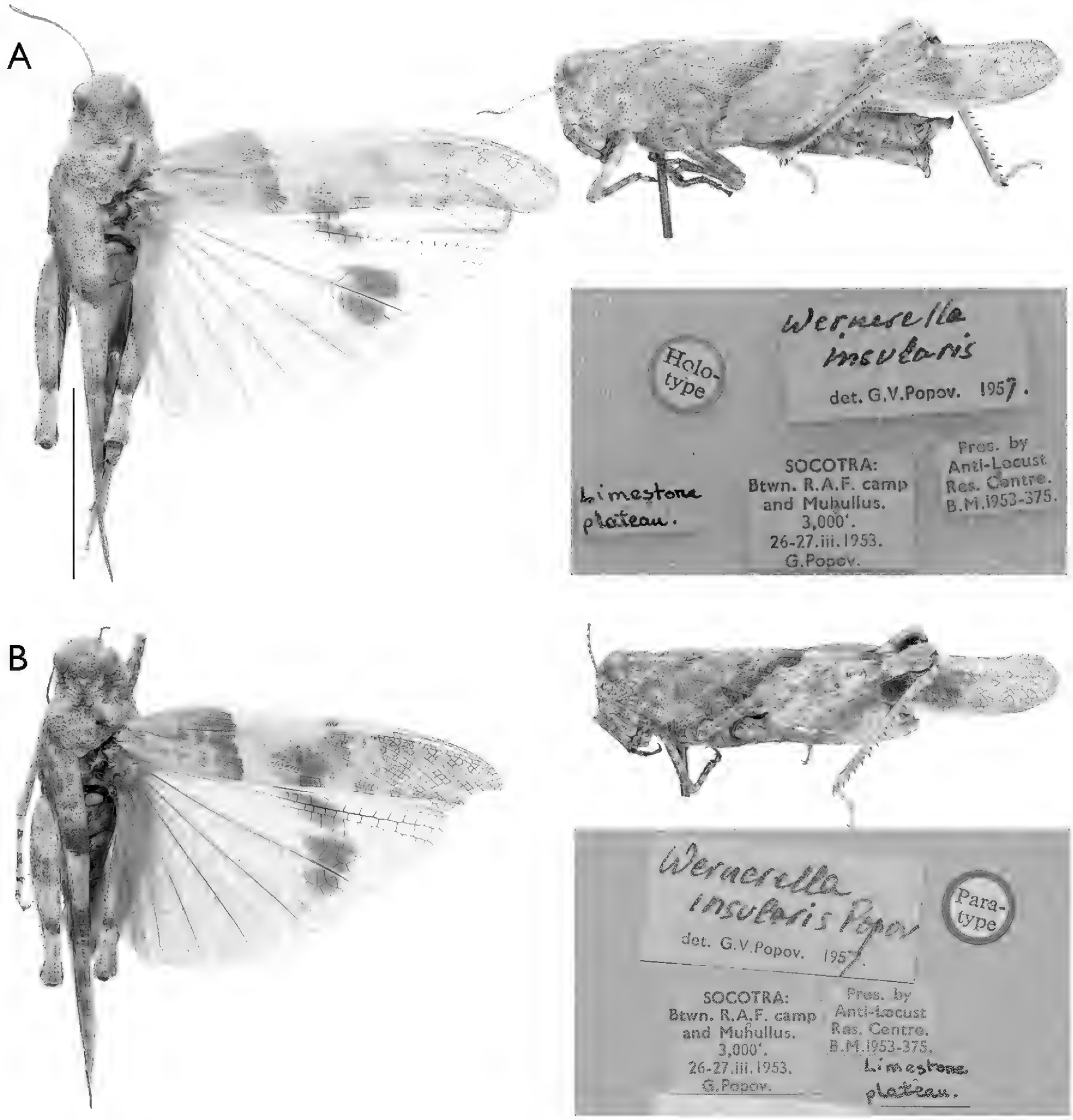

Figure 95. *Sphingonotus* (*S.*) *insularis* (Popov, 1957), female holotype, male paratype. **A.** Female, holotype; **B.** Male, paratype. Collected on Socotra by George Popov in 1953. Scale bar: 1 cm (photograph Rob Felix).

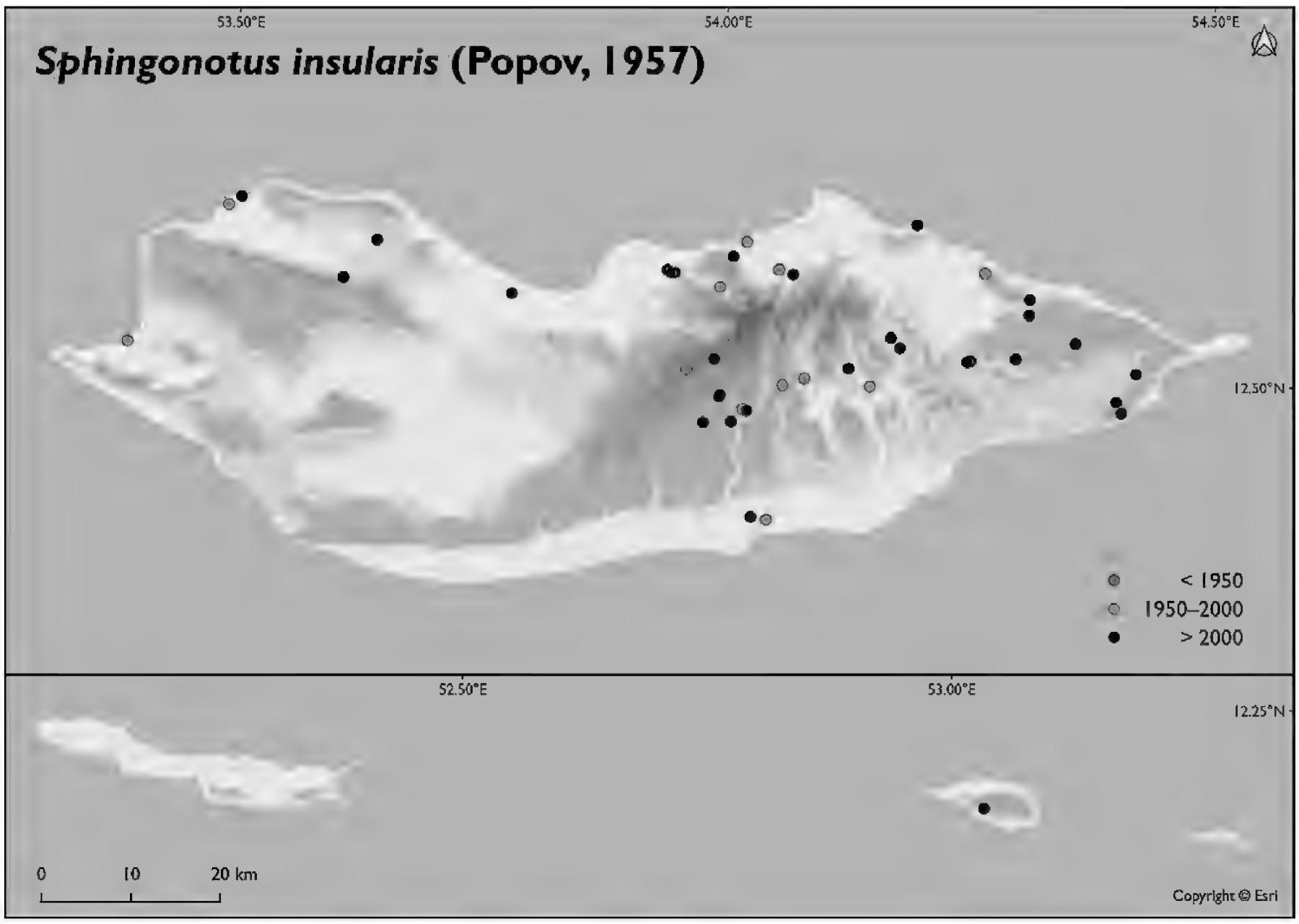

Figure 96. Distribution of *Sphingonotus* (*S.*) *insularis* (Popov, 1957) in the Socotra Archipelago.

Figure 97. *Sphingonotus* (*S.*) *insularis* (Popov, 1957) female in its habitat. Wadi Zerig, Socotra, 21 Feb 2009 (photograph Rob Felix).

that *Wernerella* is polyphyletic, comprising ancient lineages and very young species, while the characters used to identify *Wernerella* are variable. Hence, the authors synonymised *Wernerella* with *Sphingonotus*.

This species and some former African *Wernerella* species have very different characteristics from all other *Sphingonotus* species, as listed by Massa (2009). The notch in the dorsal carina of the hind femur is an important characteristic of *Oedipoda* Latreille, 1829 (in Oedipodini Walker (1871)). However, the head rising above the pronotum (although not visible in Fig. 95 because of the angle) is a character for *Sphingonotus* (in Sphingonotini Johnston (1956)), as does the low median carina of the pronotum that is not raised as in *Oedipoda.* Based on the above-mentioned unique as well as intermediate characteristics between *Sphingonotus* and *Oedipoda*, the erection of a new genus for *Sphingonotus insularis* and some other species formerly included in *Wernerella*, such as *S. somalicus* (Johnsen, 1985), is suggested.

Distribution and occurrence. The species occurs on Socotra and Samha Is. and is endemic to the Socotra Archipelago. It is widespread and common from the plains to the higher limestone plateaus. It is absent from the higher regions in the Hagher (Fig. 96).

Habitat and biology. *Sphingonotus insularis*, as a geophilous species, can be found on all kinds of dry and bare, gravelly soils from 0–900 m a.s.l. in sparse dwarf shrubland, low *Croton-Jatropha* shrubland, high shrubland with succulents, Frankincense and *Dracaena* woodland and forest and submontane shrubland and grassland. Records are from all months.

Bioacoustics. In the available recordings, two elements can be recognised, which possibly represent both courtship and rivalry. The first element exists of repeated echemes of 3 (2–5) loosely grouped syllables (Fig. 98). Syllables last about 18–20 ms and the syllable repetition rate within these echemes is about six per second. A clear up and downstroke within a syllable is visible in the oscillogram. The first element has a peak frequency of 3–4 kHz.

The second element is formed by an echeme with 13–21 syllables (Fig. 99). The syllable duration is about 4 ms and syllables are repeated at the rate of about five per

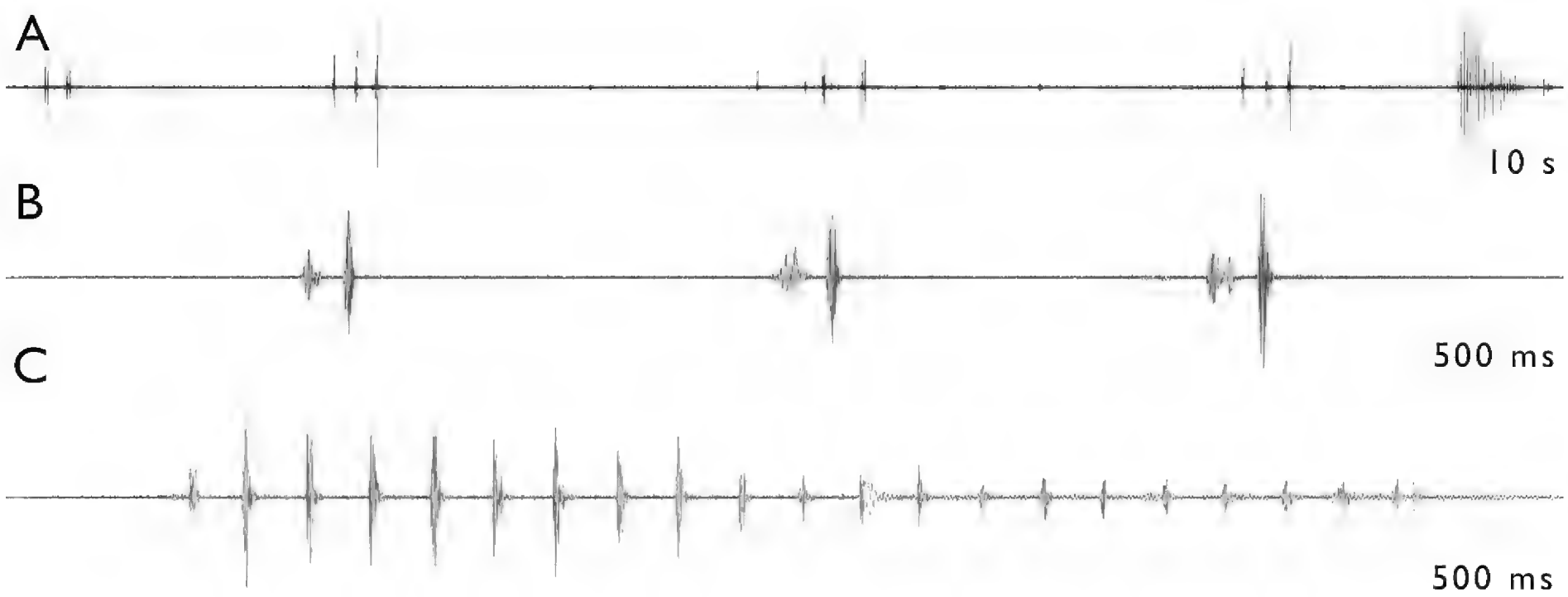

Figure 98. Calling song of *Sphingonotus* (*S.*) *insularis* (Popov, 1957). Oscillograms depicting 10 s with loose syllables and a long echeme (**A**), 500 ms with loose syllables (**B**) and 500 ms of a long echeme (**C**). Zeflh, Momi, Socotra, 2 Nov 2010, 12:32 h; RecRF10185; SpRF10YE080; XC877933, accessible at https://www.xeno-canto.org/877933.

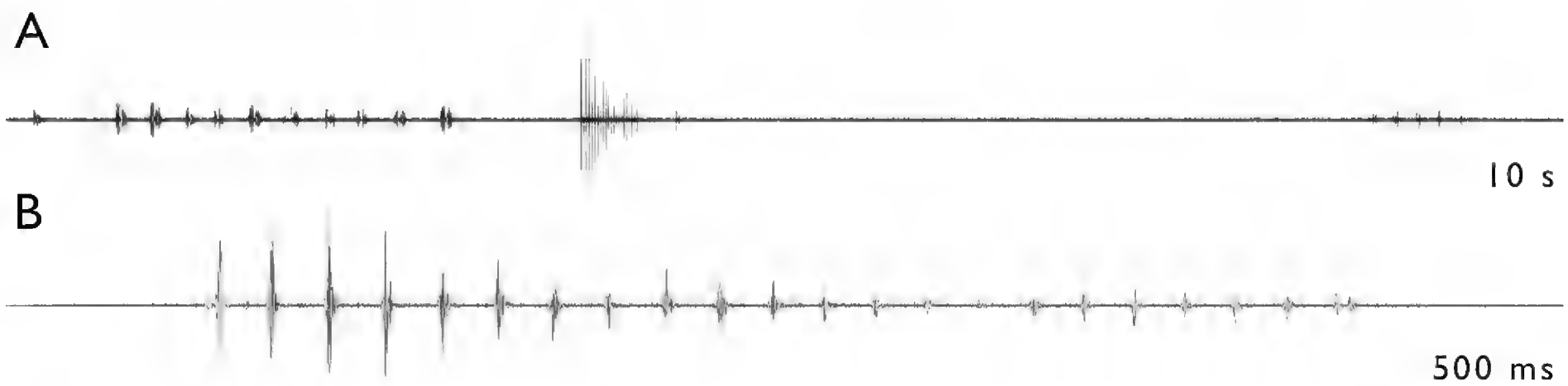

Figure 99. Calling song of *Sphingonotus* (*S.*) *insularis* (Popov, 1957). Oscillograms depicting 10 s of a long echeme (**A**) and 500 ms of a long echeme (**B**). Zeflh, Momi, Socotra, 2 Nov 2010, 12:29 h; RecRF10183; SpRF10YE080; XC877935, accessible at https://www.xeno-canto.org/877935.

second. This echeme has a broader frequency spectrum and seems to be produced by wing flapping, but the latter needs to be confirmed. Massa (2009) observed specimens producing a sound before taking off. This may refer to the latter sound element.

Sphingonotus (*Sphingonotus*) *rubescens* (Walker, 1870)

Fig. 100

References for Socotra. Dey et al. 2021: 132, fig. 1, table S3b.

Diagnostic notes. *Sphingonotus* (*Sphingonotus*) *rubescens* (Walker, 1870) has a pattern of relatively small dark spots on the tegmina with less clear transverse bands, hyaline hind wings and a characteristic strongly S-shaped intercalary vein (Mistshenko 1937).

Distribution and occurrence. It is widespread in northern Africa, southern Europe, Arabia and parts of Asia (Husemann 2020; Dey et al. 2021). It was newly reported for Socotra based on one specimen collected in 2010 (Dey et al. 2021). We found one specimen in Wranik's collection from Samha, 1999 (Fig. 100).

Habitat and biology. On Socotra, one specimen was found on a gravelly slope at 150 m a.s.l. near Hadiboh.

Bioacoustics. The song of this species consists of whistling and ticking sounds (e.g. Baudewijn Odé, XC786864, accessible at https://www.xeno-canto.org/786864) and is described by Bland (1985).

Eumastacoidea

Thericleidae

Plagiotriptinae

Remarks. The Thericleidae is a large Afrotropical family of peculiar, phytophilous grasshoppers with a laterally flattened body and a high degree of sexual dimorphism in body size and shape of the head and pronotum (Descamps 1977). Descamps (1970) revised the Thericleidae of Socotra and moved all Socotran species previously considered as *Brachytypus* Burr, 1904 to *Phaulotypus* Burr, 1899, based on the shape of the carinulae of the frontal ridge and added them to the Thericleinae. He thoroughly re-described the genus *Phaulotypus* and provided a key to all four species of the endemic genus. Descamps (1977) later moved *Phaulotypus* and *Socotrella* from the subfamily Thericleinae to the Plagiotriptinae, based on the number of outer apical spines on the median tibia: two in Thericleinae and three in Plagiotriptinae.

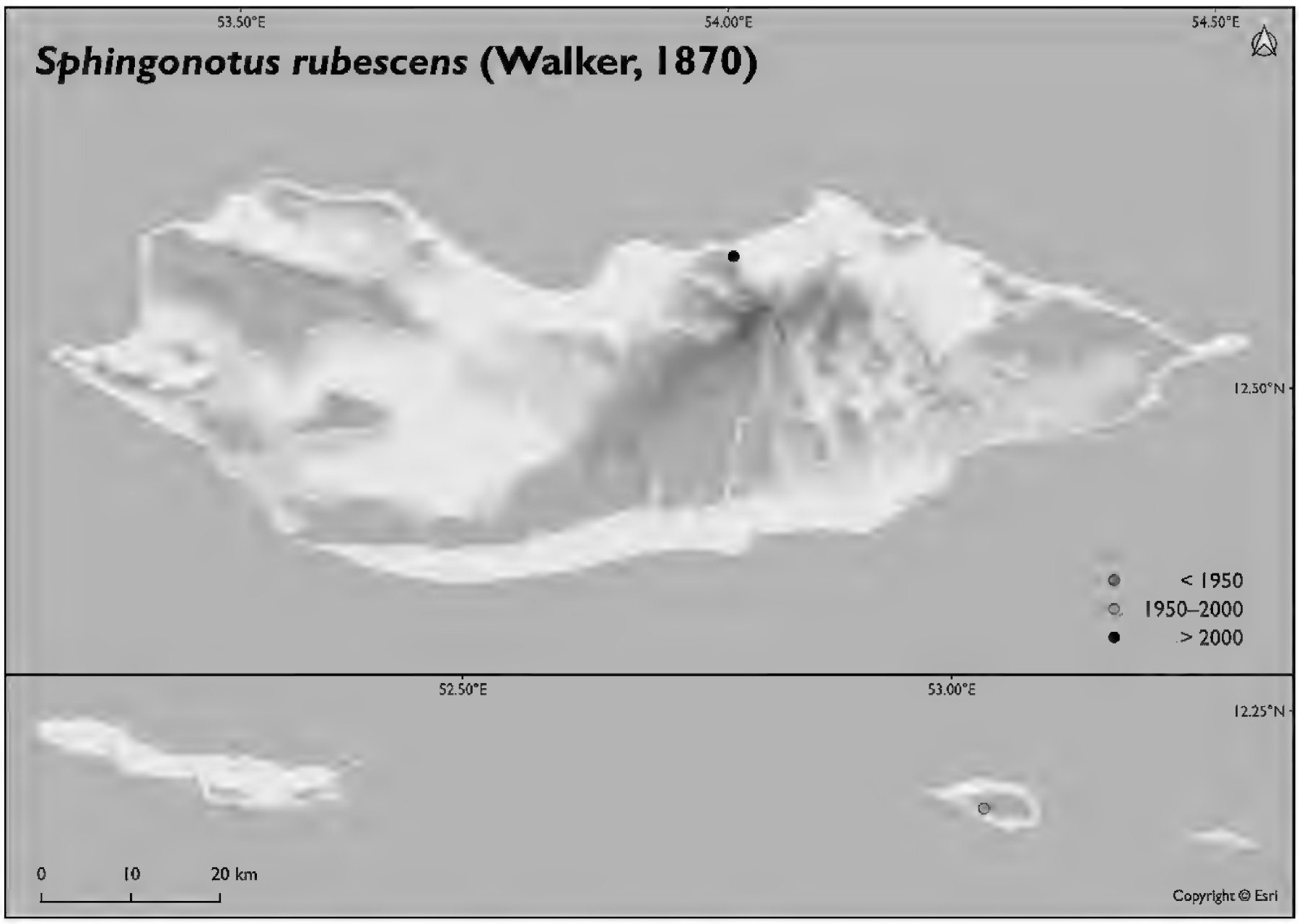

Figure 100. Distribution of *Sphingonotus rubescens* Walker, 1870 in the Socotra Archipelago.

Phaulotypini

Phaulotypus dioscoridus (Popov, 1957)

Figs 102, 103

References for Socotra. Popov (in Uvarov and Popov (1957)): 367–369, figs 14, 15 [as *Brachytypus dioscoridus*]; Descamps 1970: 124–126, 129, figs 7–9; Descamps 1977: 50, 78–79, figs 137–139; Popov 1997: 120–122, figs 5, 6; Wranik 2003: 319, plate 154.

Diagnostic notes. *Phaulotypus dioscoridus* is a small, uniformly green or greenish-brown species. The female pronotum protrudes posteriorly, ending in a sharp angle, covering both the meso- and metanotum (Fig. 102), but less so than in *P. granti* (Fig. 105). In males, the spines on the median carina on the femur are small and the vertex's fastigium protrudes slightly above the eye's upper edge.

Distribution and occurrence. Endemic to Socotra. *P. dioscoridus* occurs in the Hagher and its vast surroundings, from sea level near Hadiboh to high in the mountains at Adho Dimello (Fig. 103). It has also been found at Wadi Zerig on Dixam Plateau. The number of records is lower than *Phaulotypus insularis*, which occurs in more or less the same habitat. For remarks on Guichard's collecting site on Mt. Shihali on 20 April 1967, see the species account of *Dioscoridus depressus*.

Habitat and biology. *Phaulotypus dioscoridus* is, like all other members of the genus, a phytophilous species living in a variety of plant species, occurring in all main vegetation types from 15–1100 m a.s.l. Popov (in Uvarov and Popov (1957)) did not find any apparent association with a specific plant species. Records are from February to April and October. Nymphs were seen in March and April.

Figure 101. *Phaulotypus granti* Burr, 1899, head. Type species of the genus, showing all characteristics of the genus: strongly diverging frontal carinulae between the eyes, forming an oblong shield with a deep median furrow; short antennae; fastigium of the vertex, which protrudes well above the dorsal margin of the eyes (photograph Rob Felix).

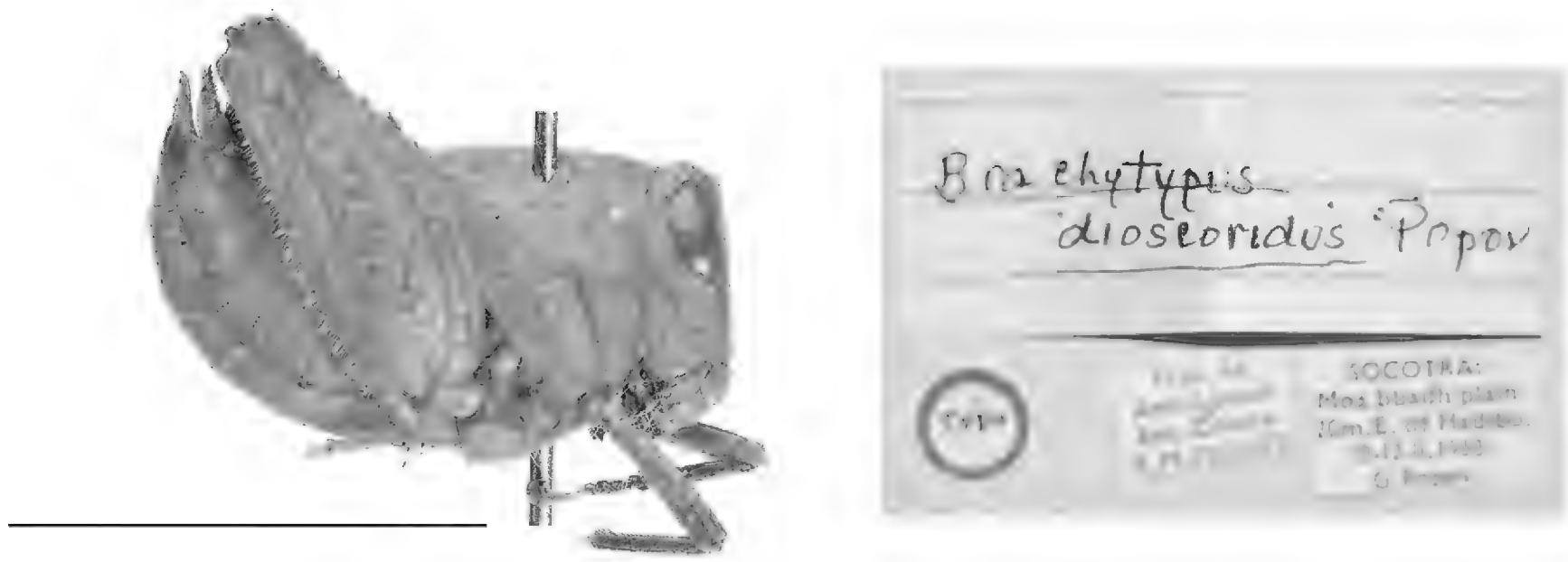

Figure 102. *Phaulotypus dioscoridus* (Popov, 1957), female, holotype. Collected at Maabad, Socotra by George Popov in 1953. Scale bar: 1 cm (photograph Rob Felix).

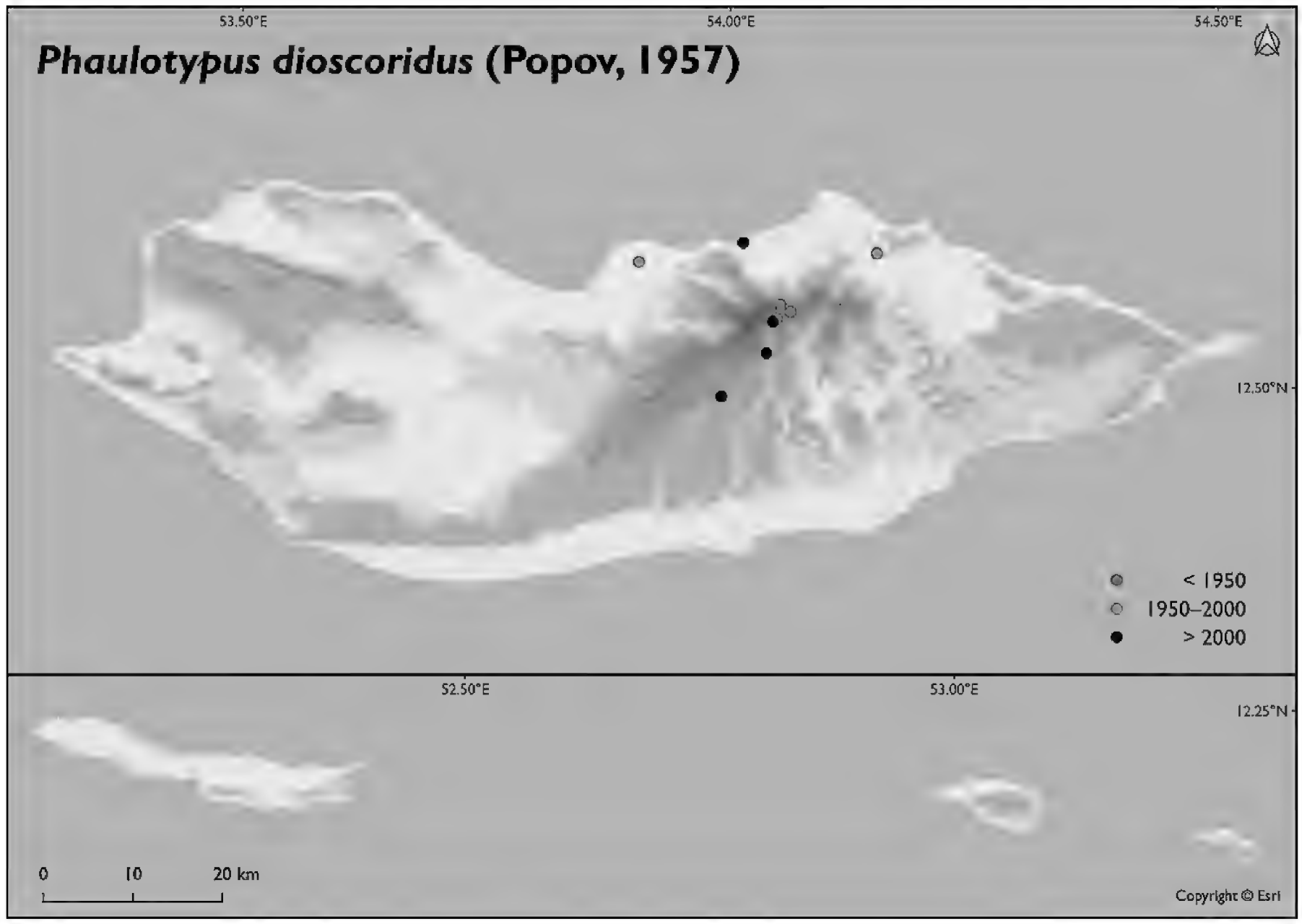

Figure 103. Distribution of *Phaulotypus dioscoridus* (Popov, 1957) in the Socotra Archipelago.

Phaulotypus granti Burr, 1899

Figs 101, 104–106

References for Socotra. Burr 1899a: 88, 303–304; Burr 1899b: 44; Burr 1903: 412, 418, plate XXV: fig. 7; Burr 1904: 5; Krauss 1907: 17, 29, 29; Popov (in Uvarov and Popov (1957)): 369, figs 16, 17; Descamps 1970: 124, 125, 128, figs 1–6; Descamps 1977: 50, 78–79, figs 131–136; Popov 1997: 120–122, figs 7–9; Wranik 2003: 319, plate 154.

Diagnostic notes. Like the previous species, *Phaulotypus granti* has a pronotum projecting posteriorly and covering the mesonotum and metanotum in females (Figs 104, 105). In this species, the extent is much more significant than in the previous. In males, the fastigium of the vertex strongly protrudes above the upper edge of the eye (Fig. 101).

Taxonomic notes. Burr (1899a) erected the genus *Phaulotypus* and he named the type species after Mr W.R. Ogilvie-Grant, who collected the Orthoptera specimens during the zoological expedition undertaken by the British and Liverpool Museums in 1889 and 1899. Descamps (1970) first described the male (neoallotype).

Distribution and occurrence. Endemic to Socotra. The species is restricted to the highest parts of the Hagher mountains (above 900 m a.s.l.) (Fig. 106). It is only known from Adho Dimello (type location), the lower slopes of Mt. Shihali and Mt. Skand. In 2010, some tens

of specimens were easily found at Adho Dimello, so it is not considered to be uncommon there.

For remarks on Guichard's collecting site on Mt. Shihali on 20 April 1967, see the species account of *Dioscoridus depressus*.

Habitat and biology. *P. granti* is restricted to montane forest and montane mosaic vegetation types from 900–1500 m a.s.l. In 2010, most specimens were found in shrubs of *Hypericum scopulorum* at Adho Dimello (Fig. 12). Shrub communities dominated by *Hypericum* and *Helichrysum* form the predominant vegetation type at the highest altitudes in the Hagher mountains (Brown and Mies 2012). Records are from all seasons.

Phaulotypus insularis (Burr, 1899)

Figs 107–109

References for Socotra. Burr 1899a: 88, 302–303 [as *Plagiotriptus insularis*]; Burr 1899b: 44 [as *Plagiotriptus insularis*]; Burr 1903: 412, 413, 417, plate XXV: fig. 6 [as *Plagiotriptus insularis*]; Burr 1904: 5–6 [as *Brachytypus* (*Plagiotriptus*) *insularis*]; Krauss 1907: 17, 29 [as *Brachytypus* (*Plagiotriptus*) *insularis*]; Popov (in Uvarov and Popov (1957)): 366, figs 10, 11 [as *Brachytypus insularis*]; Popov (in Uvarov and Popov (1957)): 369, figs 18, 19 [as *Clerithes* (*?*) *nanus*]; Descamps 1970: 124, 126, 130, figs 23–30; Descamps 1977: 50, 79, 80,

Figure 104. *Phaulotypus granti* Burr, 1899, male (left), female (right). Adho Dimello, Socotra, 30 Oct 2010 (photographs Robert Ketelaar).

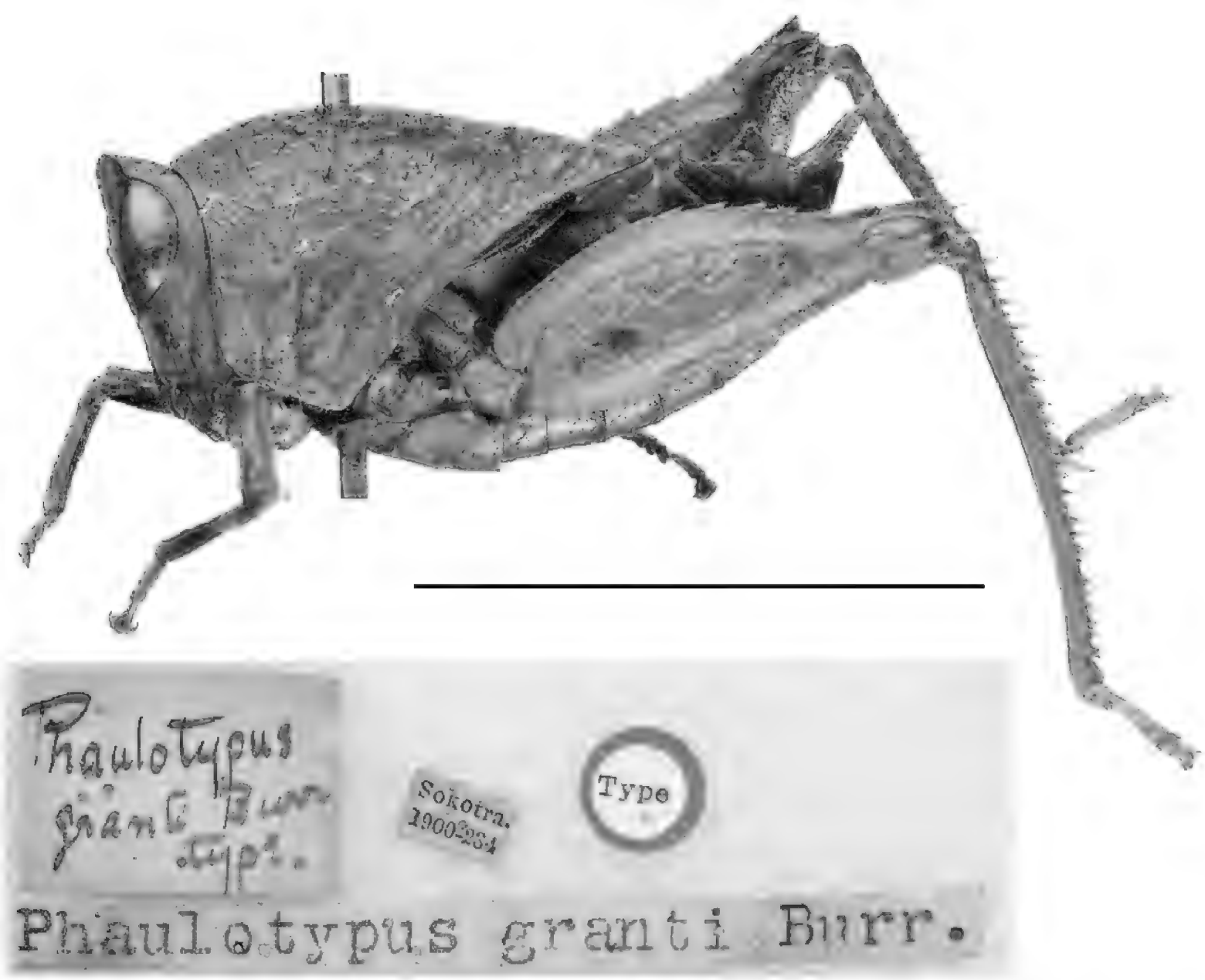

Figure 105. *Phaulotypus granti* Burr, 1899, female, holotype. Collected at Adho Dimello, Socotra by Forbes and Ogilvie-Grant in 1899. Scale bar: 1 cm (photograph Rob Felix).

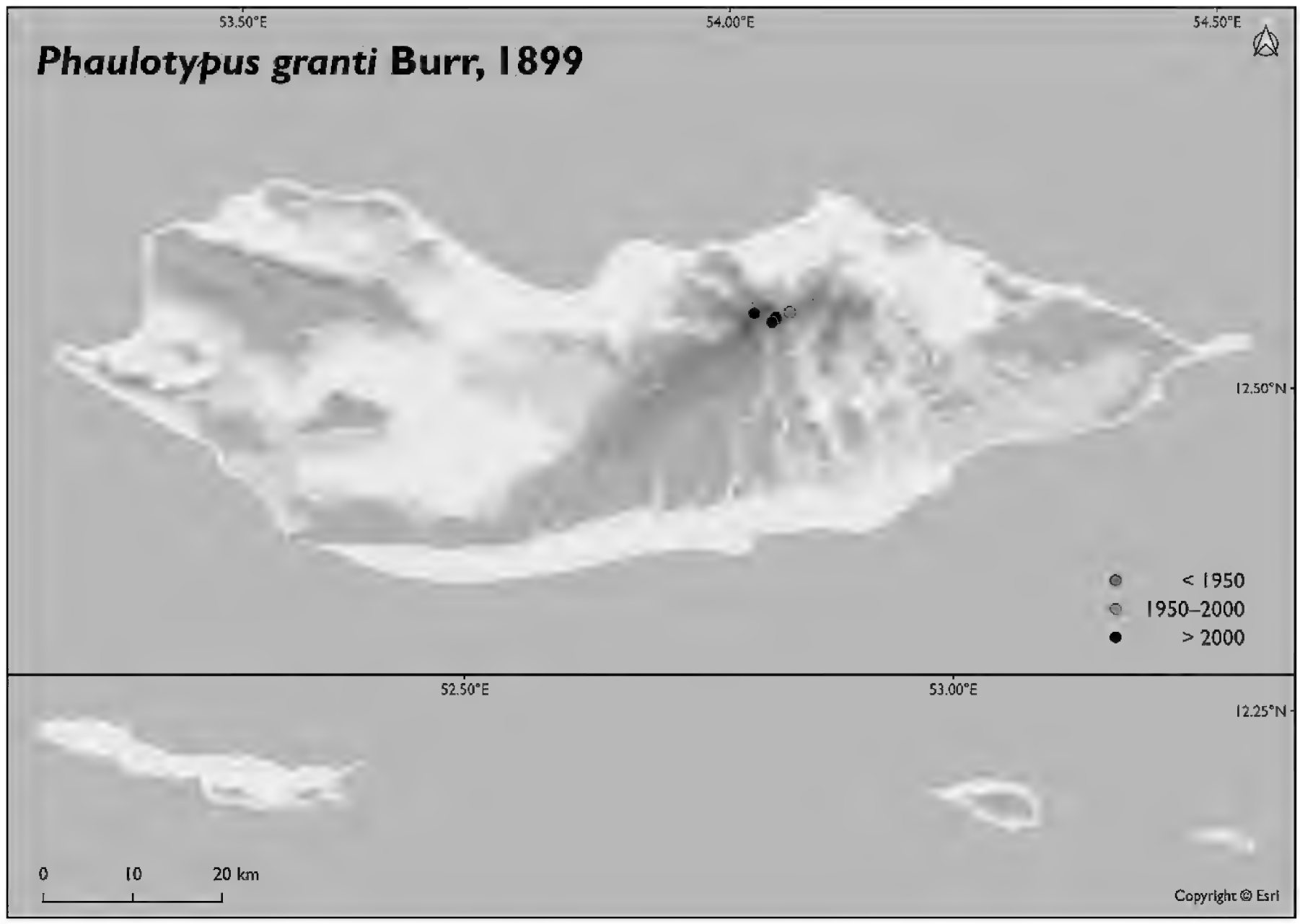

Figure 106. Distribution of *Phaulotypus granti* Burr, 1899 in the Socotra Archipelago.

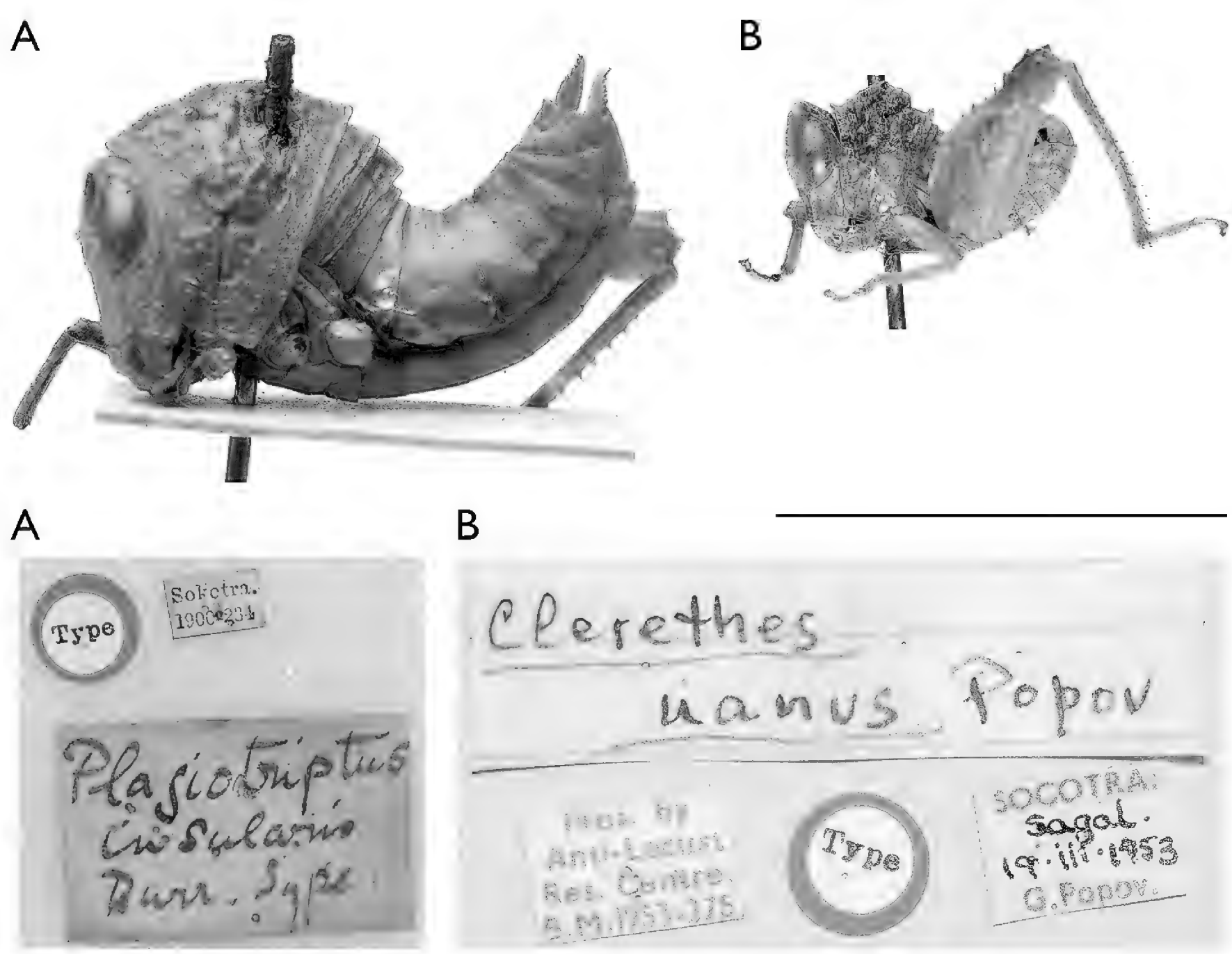

Figure 107. *Phaulotypus insularis* (Burr, 1899), female, male, type specimens. **A.** Female holotype; **B.** Male holotype of *Clerithes nanus* Popov, 1957, a synonym of *P. insularis*. Scale bar: 1 cm (photograph Rob Felix).

Figure 108. *Phaulotypus insularis* (Burr, 1899), copula. Dineghen, Socotra, 30 Oct 2010 (photograph Robert Ketelaar).

figs 153–160; Popov 1997: 120–122, figs 10–12; Wranik 2003: 318, plates 150, 154.

Diagnostic notes. *Phaulotypus insularis* is a small brown, sometimes greenish species. The female pronotum is not protruding posteriorly. The median carina on the male femur is armed with large spines. The male pronotum has a strongly sinuous and humped median carina (Figs 107, 108). The ventral carina of the hind femur is smooth in both sexes.

Taxonomic notes. Descamps (1970) synonymised *Clerithes nanus* Popov, 1957 with *Phaulotypus insularis* (Burr, 1899). The holotype of the former appeared to be the male of *P. insularis*.

Distribution and occurrence. *Phaulotypus insularis* is a widespread and common endemic to Socotra (Fig. 109). It can be found wherever there are shrubs.

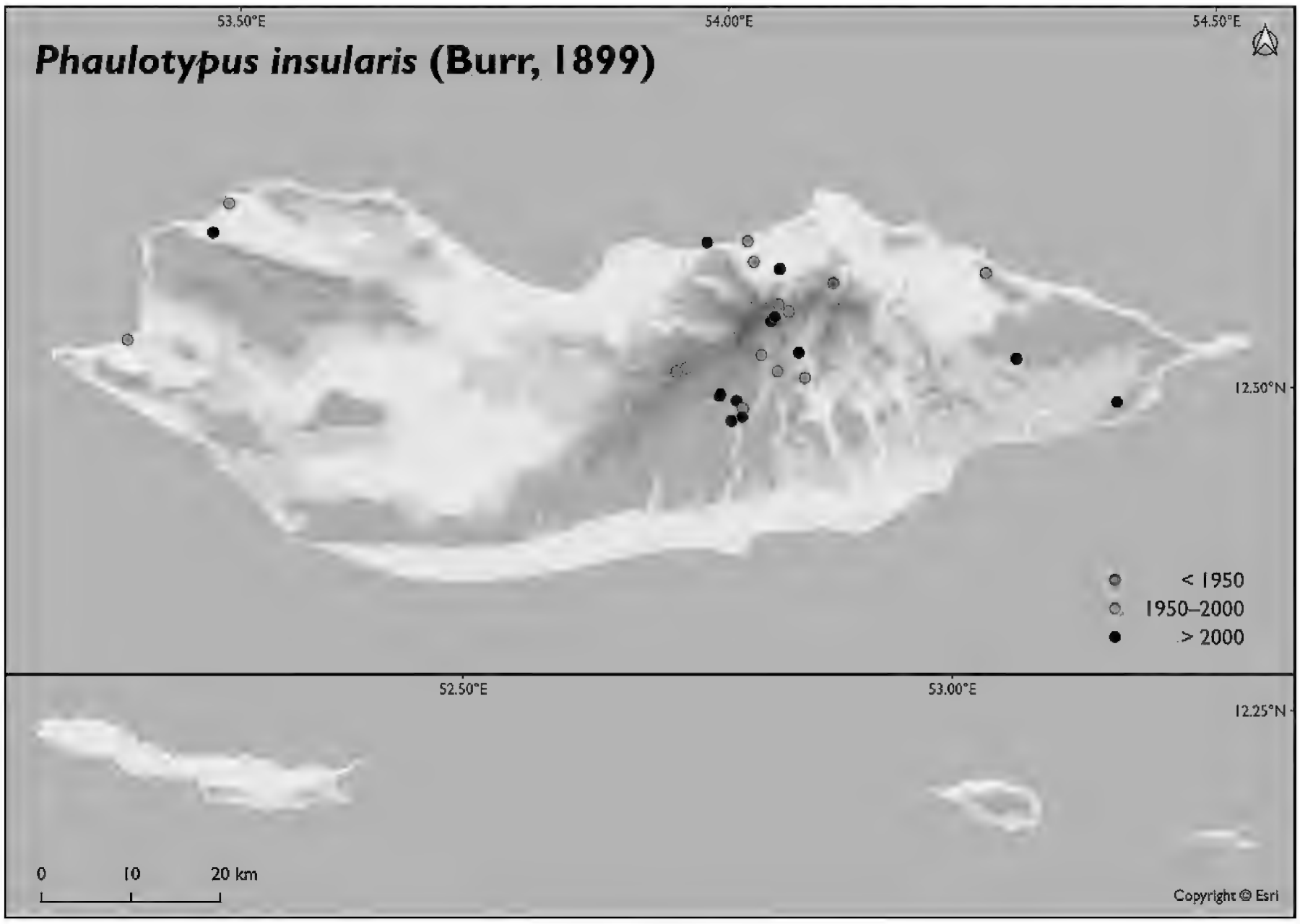

Figure 109. Distribution of *Phaulotypus insularis* (Burr, 1899) in the Socotra Archipelago.

Figure 110. *Phaulotypus socotranus* (Popov, 1957), female. Dineghen, Socotra, 30 Oct 2010 (photograph Robert Ketelaar).

Habitat and biology. Like all species in the genus, *P. insularis* is a phytophilous species found in various bushes like *Jatropha unicostata* Balf.f., but also on rocks or the ground. It occurs from 10–1100 m a.s.l. and in all seasons. Nymphs were recorded in April.

Phaulotypus socotranus (Popov, 1957)

Figs 110–113

References for Socotra. Popov (in Uvarov and Popov (1957)): 367, figs 12, 13 [as *Brachytypus socotranus*]; Descamps 1970: 124, 126, 127, 129–130, figs 10–22, 31; Descamps 1977: 50, 78, 80, figs 140–152, 161; Popov 1997: 120–122, figs 13–15; Wranik 2003: 319, plates 150, 154.

Diagnostic notes. *Phaulotypus socotranus* is the largest member of the Thericleidae family. It is a bright green species with a characteristic bluish dorso-median line on the abdomen with yellow spots (Fig. 110). In females, the median carina of the pronotum is evenly convex. In males, the pronotum is only slightly humped in the middle (Fig. 111). The ventral carina of the hind femur is strongly granulose in both sexes.

Distribution and occurrence. *P. socotranus* is a rather scarce Socotran endemic. The species is only recorded

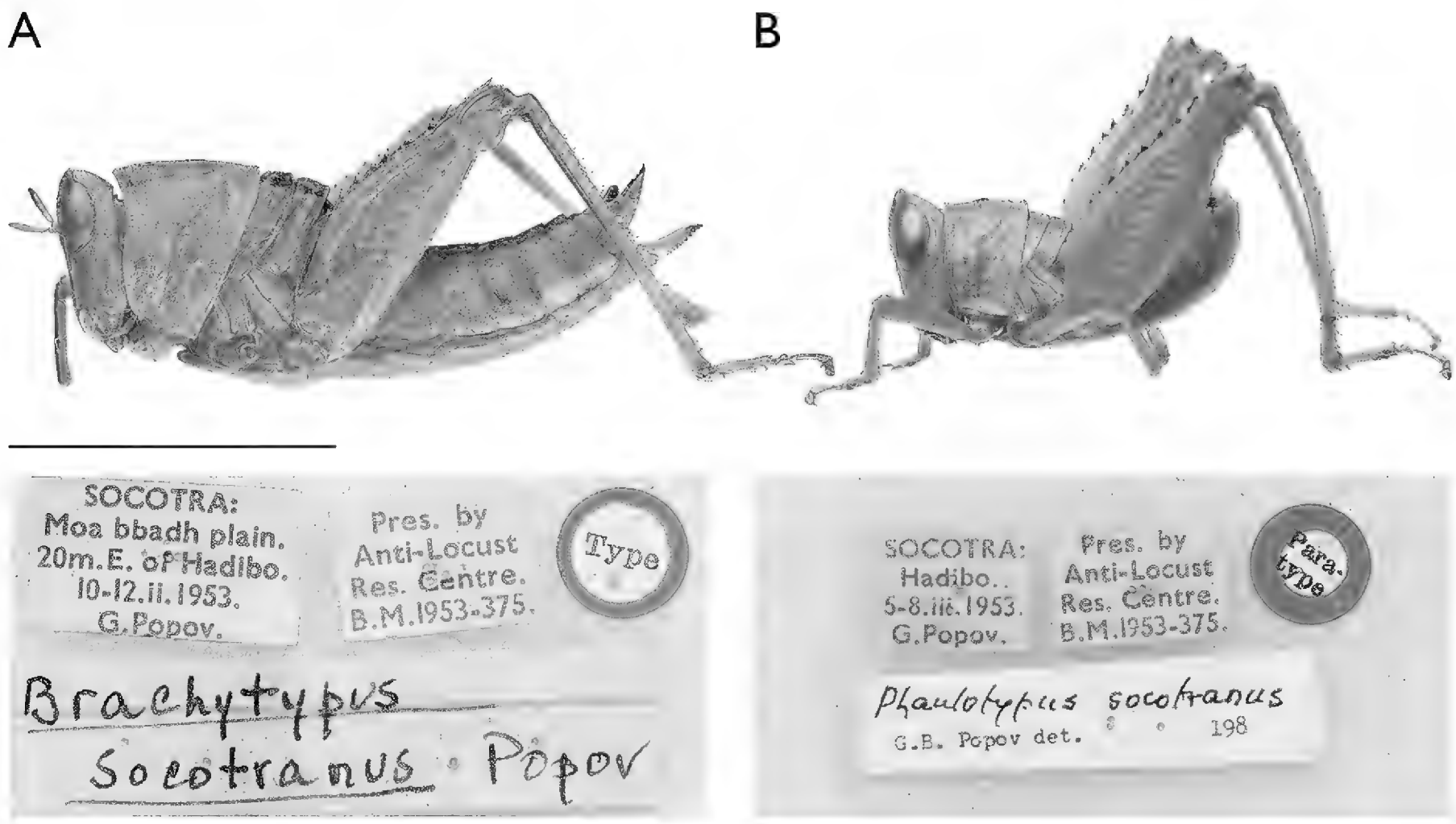

Figure 111. *Phaulotypus socotranus* (Popov, 1957), female, male, types specimens. **A.** Female holotype; **B.** Male paratype. Scale bar: 1 cm (photograph Rob Felix).

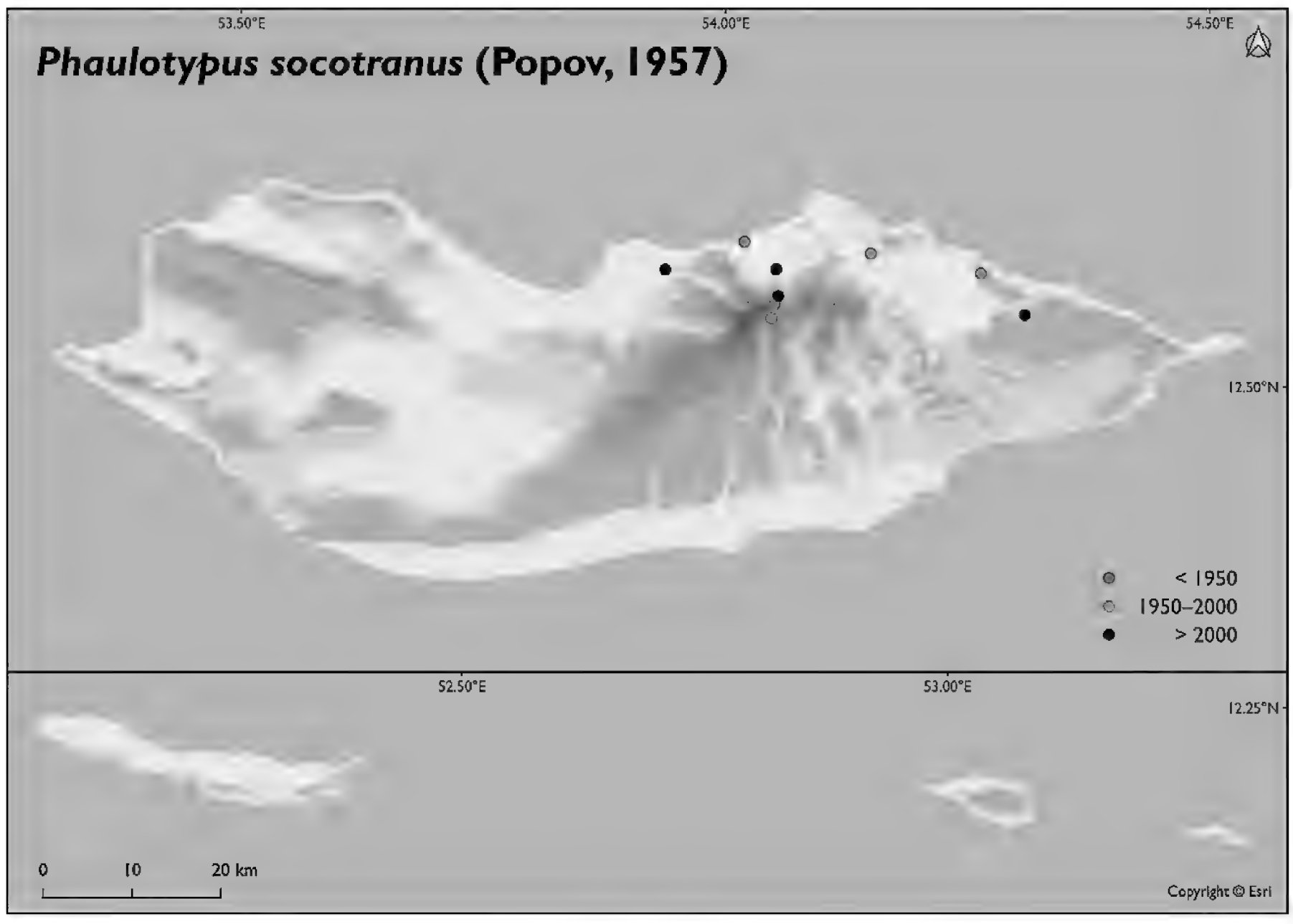

Figure 112. Distribution of *Phaulotypus socotranus* (Popov, 1957) in the Socotra Archipelago.

Figure 113. *Phaulotypus socotranus* (Popov, 1957), female in its habitat. Wadi Dineghen, Socotra, 30 Oct 2010, feeding from *Jatropha unicostata* (photograph Rob Felix).

in and around the Hagher and on the eastern limestone plateaus (Fig. 112). It is probably under-recorded because of its arboreal lifestyle.

Habitat and biology. Popov (in Uvarov and Popov (1957)) mentioned this species as strongly associated with *Jatropha unicostata*. The specimens collected in 2010 were all found in this shrub (Fig. 113). *P. socotranus* occurs from 25–1000 m a.s.l. Records are from all seasons.

Socotrellini

Socotrella monstrosa Popov, 1957

Figs 114–116

References for Socotra. Popov (in Uvarov and Popov (1957)): 370–371, fig. 20–22; Descamps 1970: 132–134, figs 33–41; Descamps 1977: 50, 82–84, figs 26, 163–171; Popov 1997: 123–124, figs 17–21; Guichard 1992: 184; Wranik 2003: 318, plate 154.

Diagnostic notes. *Socotrella monstrosa* is an unmistakable species with an atypical appearance, characterised by its strongly rugose body (Figs 114, 115). Contrary to *Phaulotypus*, it has ten antennal segments and the vertex of the fastigium is laterally compressed and strongly projects forward in front of the eyes (Fig. 114). The median frontal carinulae are separated between the antennae, but do not form a broad shield as in *Phaulotypus*. The pronotum is short in both sexes, with an elevated posterior part.

Figure 114. *Socotrella monstrosa* Popov, 1957, female. Adho Dimello, Socotra, 31 Oct 2010 (photograph Robert Ketelaar).

The abdomen is long and straight, not curved upwards as in *Phaulotypus* and has a clear median carina. The hind femora are rather slender.

Taxonomic notes. Descamps (1970) thoroughly re-described the genus *Socotrella* Popov, 1957. He first described the male (neoallotype) collected by Guichard at Wadi Dineghen. Furthermore, he mentioned the female from Wadi Darho as aberrant in the pronotum shape and colour (Descamps 1970).

Distribution and occurrence. *Socotrella monstrosa* is endemic to Socotra and only found in the Hagher Mountains (Fig. 116). The species seems to occur in very low densities. Popov (in Uvarov and Popov (1957)) stated that, after finding his specimen, he looked for several hours on two occasions without seeing another one.

Guichard erroneously named the wadi flowing south from Adho Dimello Wadi Dajoj (Guichard 1967). According to the map of the Royal Geographical Society (1978), this wadi is called Wadi Darho, as also stated by Bezděk et al. (2012). Wadi Dajoj [Dajog] does exist, but is situated much further east (Royal Geographical Society 1978; Bezděk et al. 2012).

Habitat and biology. The species occurs in wooded areas in the foothills and high up in the Hagher in Frankincense woodland, montane forest and mosaic. Popov collected his specimen on bare, gravelly ground at 914 m a.s.l. (Popov in Uvarov and Popov (1957)). Based on the specimen's structure and colouration, Povov suggested that it probably is a phytophilous species living on the bark of trees.

Indeed, Guichard collected five males and one female in 1967 on the bark of *Acacia pennivenia* at Zufuk, in the "hills behind the Sultan's palace", in a "fine glade" near a clear stream (Guichard 1967, 1992). According to the labels, these specimens were collected at Hadiboh Plain at an elevation of 50 m a.s.l. However, Guichard's field notes (1967) mentioned that the species was found in the hills, suggesting the elevation must have been higher, at least several hundred metres.

The 2010 specimen was found on a rock in dense montane shrubland at 768 m a.s.l., probably on more or less the same site as the specimen collected by Guichard in Wadi Darho. Records are from March, April and October.

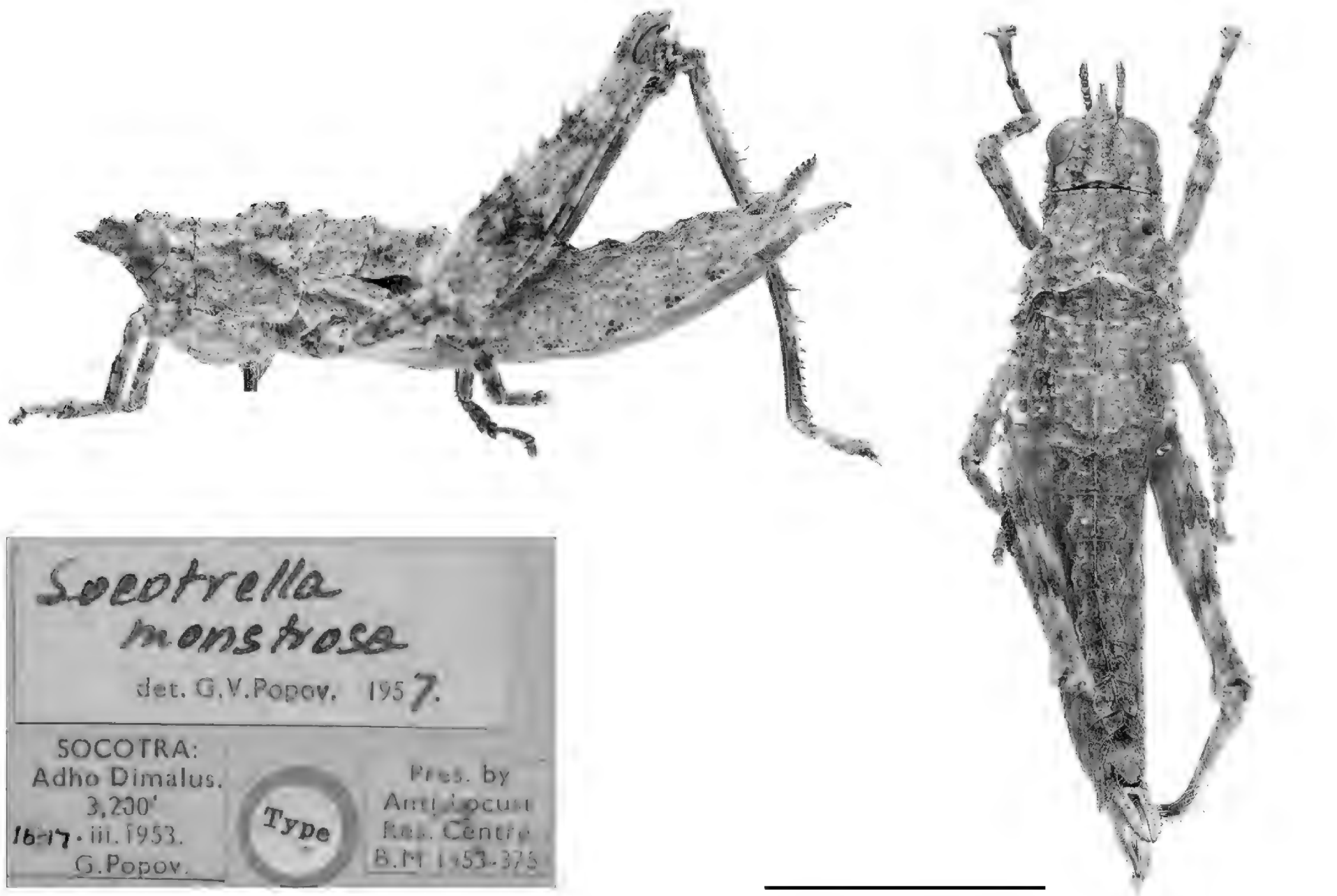

Figure 115. *Socotrella monstrosa* Popov, 1957, female, holotype. Collected at Adho Dimello, Socotra, in 1953. Scale bar: 1 cm (photograph Rob Felix).

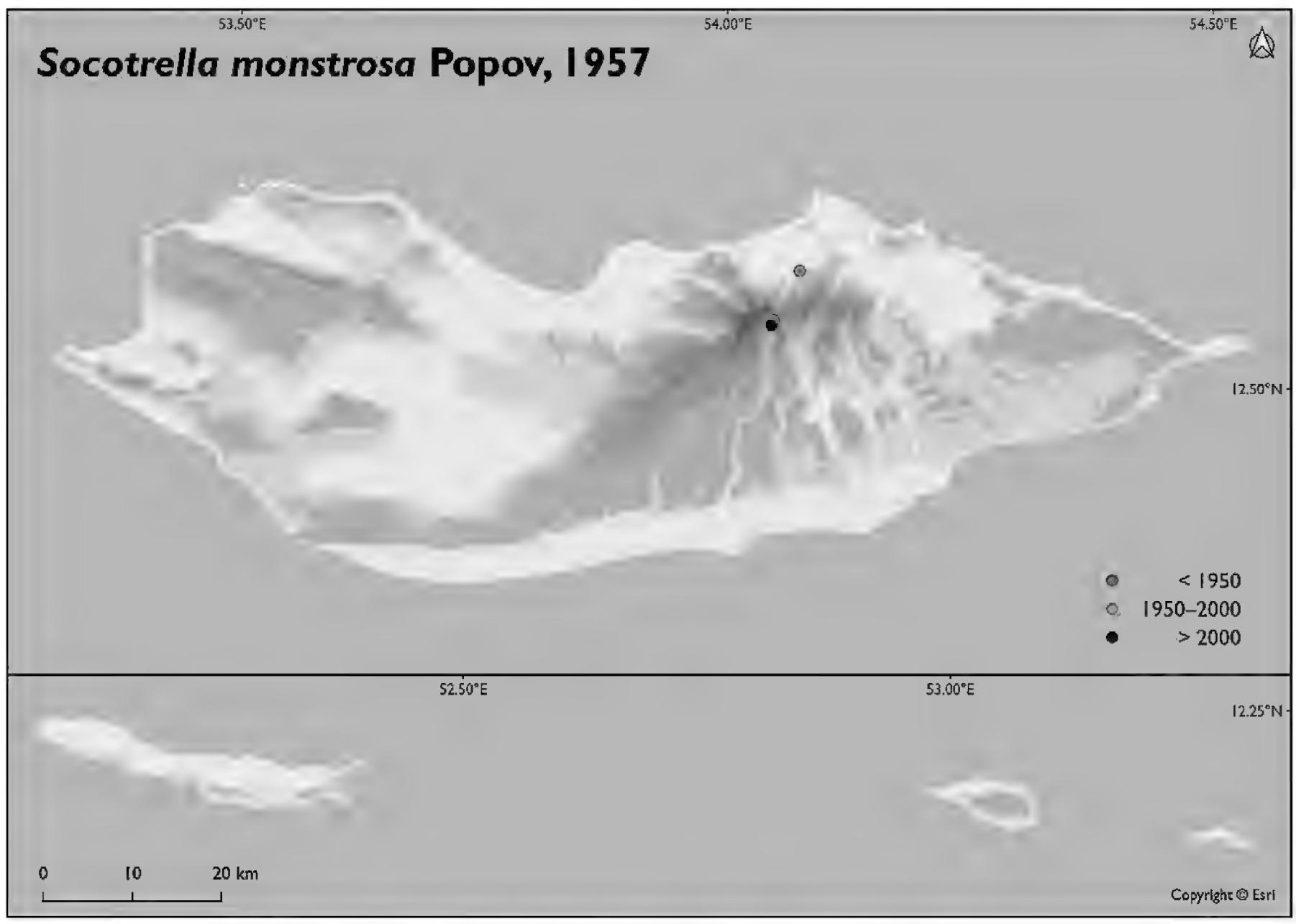

Figure 116. Distribution of *Socotrella monstrosa* Popov, 1957 in the Socotra Archipelago.

Figure 117. *Dictyophorus griseus* (Reiche & Fairmaire, 1849), male. On 16 Jan 2019, a specimen of this African species was found near Hadiboh, probably originating from a recent unintended introduction (photograph David Jeník, Brno).

Pyrgomorphoidea
Pyrgomorphidae
Pyrgomorphinae
Dictyophorini

Dictyophorus griseus (Reiche & Fairmaire, 1849)

Fig. 117

Distribution and occurrence. *Dictyophorus griseus* is a common and widespread species in tropical Africa. The only known specimen from Socotra was photographed on 16 Jan 2019 near Hadiboh (Fig. 117). It is not a native species to the Archipelago and must have been introduced. It was probably ship-assisted.

Habitat and biology. *Dictyophorus griseus* is a woodland species in its native range, but can also be a severe pest in agricultural fields and gardens (Rowell et al. 2015). Future colonisations must be eliminated at an early stage since this species can become invasive and significantly threaten native Orthoptera species.

Phymateini

Physemophorus sokotranus (Burr, 1898)

Figs 118–122

References for Socotra. Burr 1898: 384–385, plate XXX, fig. 4 [as *Poecilocerus sokotranus*]; Krauss 1900: 155–157, figs 1–4 [as *Poecilocerus socotranus* (sic)]; Burr 1903: 412, 419–420 [as *Poecilocerus sokotranus*]; Bolívar 1904: 434 [as *Poecilocerus sokotranus*]; Krauss 1907: 17, 21–23, 29, plate II: fig. 5 [as *Physemophorus socotranus* (sic)]; Popov (in Uvarov and Popov (1957)): 371 [as *Physemophorus socotranus* (sic)]; Kevan 1973: 1169; Popov 1997: 143–145, figs 73, 74; Wranik 1998: 171 [as *Physemophorus socotranus* (sic)]; Wranik 2003: 320, plates 150, 154.

Diagnostic notes. *Physemophorus sokotranus* is a unique and beautifully, but subtly coloured grasshopper with soft tones of greyish-green, olive-green, reddish-brown and black (Fig. 118). The most peculiar characteristic of this species is the knob-like tubercle on the dorsal side of the first tergite (Figs 119, 122). It measures 1 mm in diameter, is present in males and females and is visible with closed wings because of a bend in the hind margin of both tegmina. Erroneously, Burr (1898) considered the pale hard knob-like tubercle as a "foreign body, possibly a fungus" and, therefore, omitted it from the species description. Krauss (1900, 1907) tried to explain the function of this tubercle, but failed and suggested it could be a light-emitting organ. Popov (1997) mentioned that the function is still unknown and that at least there is no such thing as a discharge of any substances in live specimens.

Taxonomic notes. According to Burr (1898), the description of *Physemophorus sokotranus* is based on two females (№ 87, 88). The specimen in OUMNH (Oxford) (labelled as type №87) was re-assigned as Lectotype by Kevan in 1958 (Fig. 119). Specimens in NHMUK are erroneously labelled as types (note by Kevan) since they were collected in 1899, a year later than the species description (Burr 1898).

Krauss (1907) erected the new genus *Physemophorus*, positioned between *Poecilocerum* and *Zonocerus*, but belonging within the *Poecilocerum* group, based on some unique characteristics like the dull colour, the short, thin legs and, above all, the knob-like tubercle on the dorsal side of the first tergite. Kevan (1973) considered the species of *Zonocerus*, common in East Africa, as the nearest, though distant relatives of *Physemophorus*. Popov (1997) placed the genus in the tribe Phymateini and subtribe Zonocerina, together with the genus *Zonocerus*.

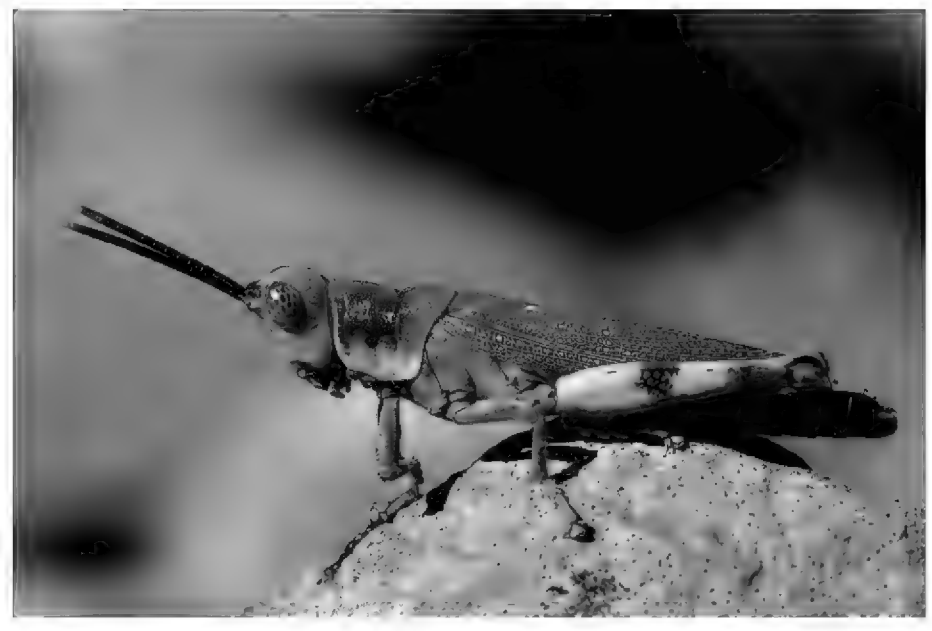

Figure 118. *Physemophorus sokotranus* (Burr, 1898), male. Zerig, Socotra, 27 Feb 2009 (photograph Robert Ketelaar).

Distribution and occurrence. *Physemophorus sokotranus* is endemic to Socotra. It is considered common by Burr (1903) and Popov (in Uvarov and Popov (1957)). It is widespread in the island's eastern half and common in the Hagher and locally on Dixam (e.g. Wadi Zerig). There are few records from the east part of the island, Homhil and Hamadero. One record is from Noged Plain on the southern shore and there is currently one western record from near Qalansiyah (Fig. 120).

Figure 119. *Physemophorus sokotranus* (Burr, 1898), female, syntype. Socotra, 1896–97. Scale bar: 1 cm (photograph Amoret Spooner and Darren Mann, OUMNH).

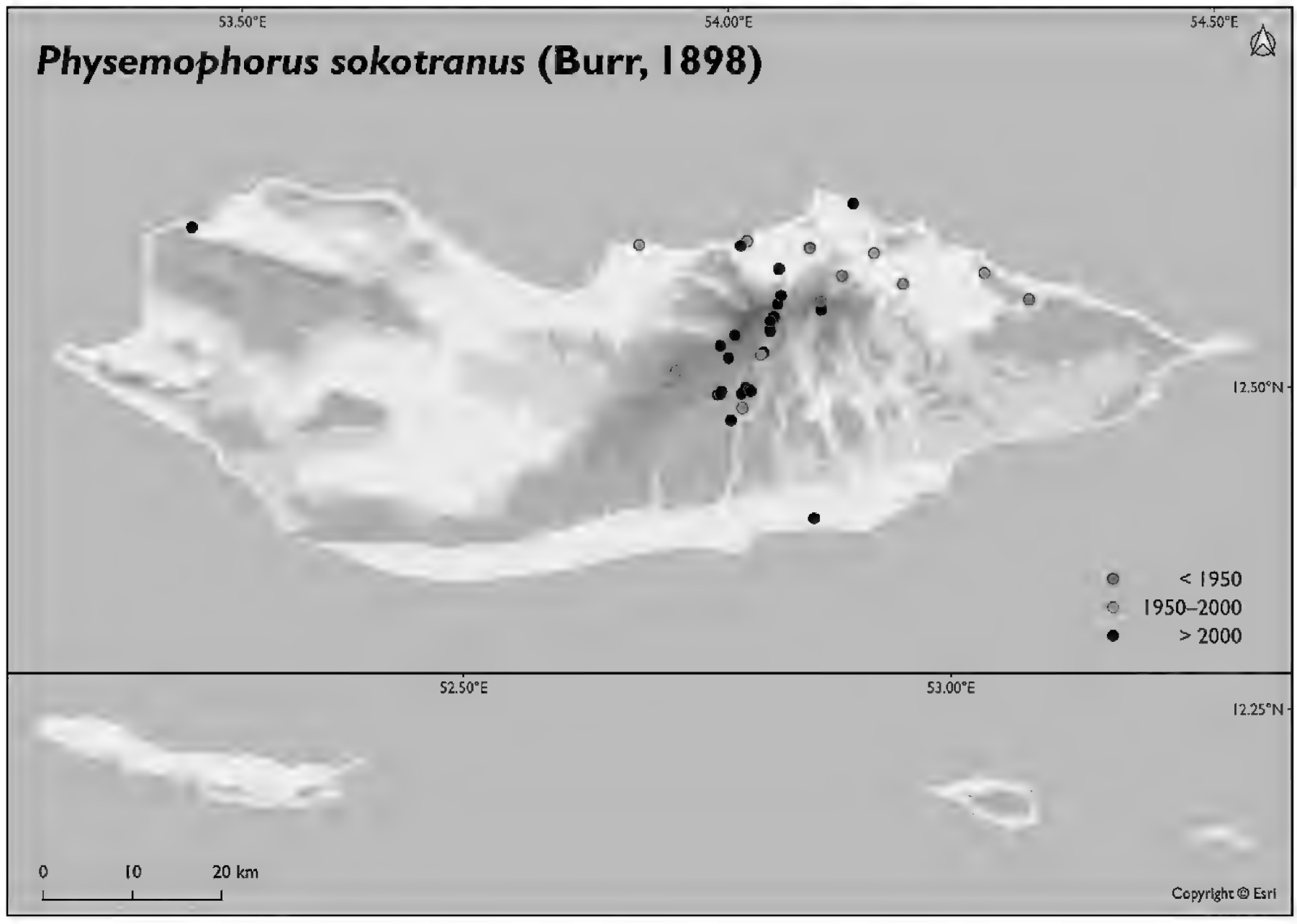

Figure 120. Distribution of *Physemophorus sokotranus* (Burr, 1898) in the Socotra Archipelago.

Figure 121. *Physemophorus sokotranus* (Burr, 1898), female. Dineghen, Socotra, 31 Oct 2010 (photograph Robert Ketelaar).

Habitat and biology. The species is found in various vegetated habitats at elevations from 10–1200 m a.s.l.: on gravelly ground, rocks, trunks of trees and within herbs and shrubs. Popov (in Uvarov and Popov (1957)) explicitly mentioned *Buxus hildebrandtii*. In 2009 and 2010, specimens were found in *Senna socotrana* and on stems and branches of *Croton socotranus* (Figs 121, 122). Popov (1997) suggested that the species is univoltine, based on sightings of adults and older nymphs in January–March and young nymphs in August.

Pyrgomorphini

Pyrgomorpha conica kurii Hsiung & Kevan, 1975

Fig. 123

References for Socotra. Burr 1903: 412, 424 [as *Pyrgomorpha cognata*]; Hsiung and Kevan 1975: 64, 66–67, figs 1F, L, R, X, 5F; Popov 1997: 152, figs 87–88, 91; Wranik 2003: 320; Massa 2009: 56; Rowell, C. Hemp and Harvey 2015: 125.

Diagnostic notes. Pyrgomorphid grasshoppers generally have a spindle-like shape, with tapered ends of the body and a maximum width in the middle. The head is conical, often with an elongated vertex, downward-facing frons, concave below the eyes, a characteristic groove along the frontal part of the vertex and slightly flattened first antenna segments. In this respect, *Pyrgomorpha* resembles members of *Truxalis* and *Oxytruxalis*.

Pyrgomorpha conica kurii and the following species are typical members of the *P. conica-bispinosa-cognata* complex (Kevan 1974; Hsiung and Kevan 1975). Species of this complex are difficult to identify. All have a relatively small size, a very variable colour, fully developed tegmina and hind wings with a pinkish hue. The *kurii* subspecies is characterised by a distinctly robust appearance, with a dorsally more convex head and more concave frons than the nominate (Hsiung and Kevan 1975). The sides of the female pronotum are diverging posteriorly over the entire length of the pronotum.

Figure 122. *Physemophorus sokotranus* (Burr, 1898), male in its habitat. On *Croton socotranus*, Zerig, Socotra 6 Nov 2010 (photograph Rob Felix).

Taxonomic notes. Hsiung and Kevan (1975) described the endemic ssp. of *P. conica* (Olivier, 1791), based on specimens collected by Guichard in 1967 and, on one specimen, collected by Forbes and Ogilvie-Grant in 1898 on Abd el Kuri.

Distribution and occurrence. Endemic to Abd el Kuri Is. and known from two sites, one on the northern shore of the island and one on the north-western slope of Jebel Saleh (Fig. 123). It is probably more widespread and not uncommon on the island, although Wranik did not collect this taxon during his visits.

Habitat and biology. The habitat on the presumed collecting site on Jebel Saleh is described in the species account of *Sphingonotus albipennis*. Records are from May and December.

Pyrgomorpha tereticornis (Brullé, 1840)

Figs 124–126

References for Socotra. Popov (in Uvarov and Popov (1957)): 371 [as *Pyrgomorpha cognata*]; Hsiung and Kevan 1975: 58, 63–64, figs 2C, F, I, L [as *Pyrgomorpha conica tereticornis*]; Popov 1997: 153–154, figs 89–91 [as *Pyrgomorpha conica tereticornis*]; Wranik 2003: 319–320, plates 150, 154 [as *Pyrgomorpha conica tereticornis*]; Massa 2009: 56 [as *Pyrgomorpha conica tereticornis*]; Rowell et al. 2015: 125 [*Pyrgomorpha conica tereticornis*].

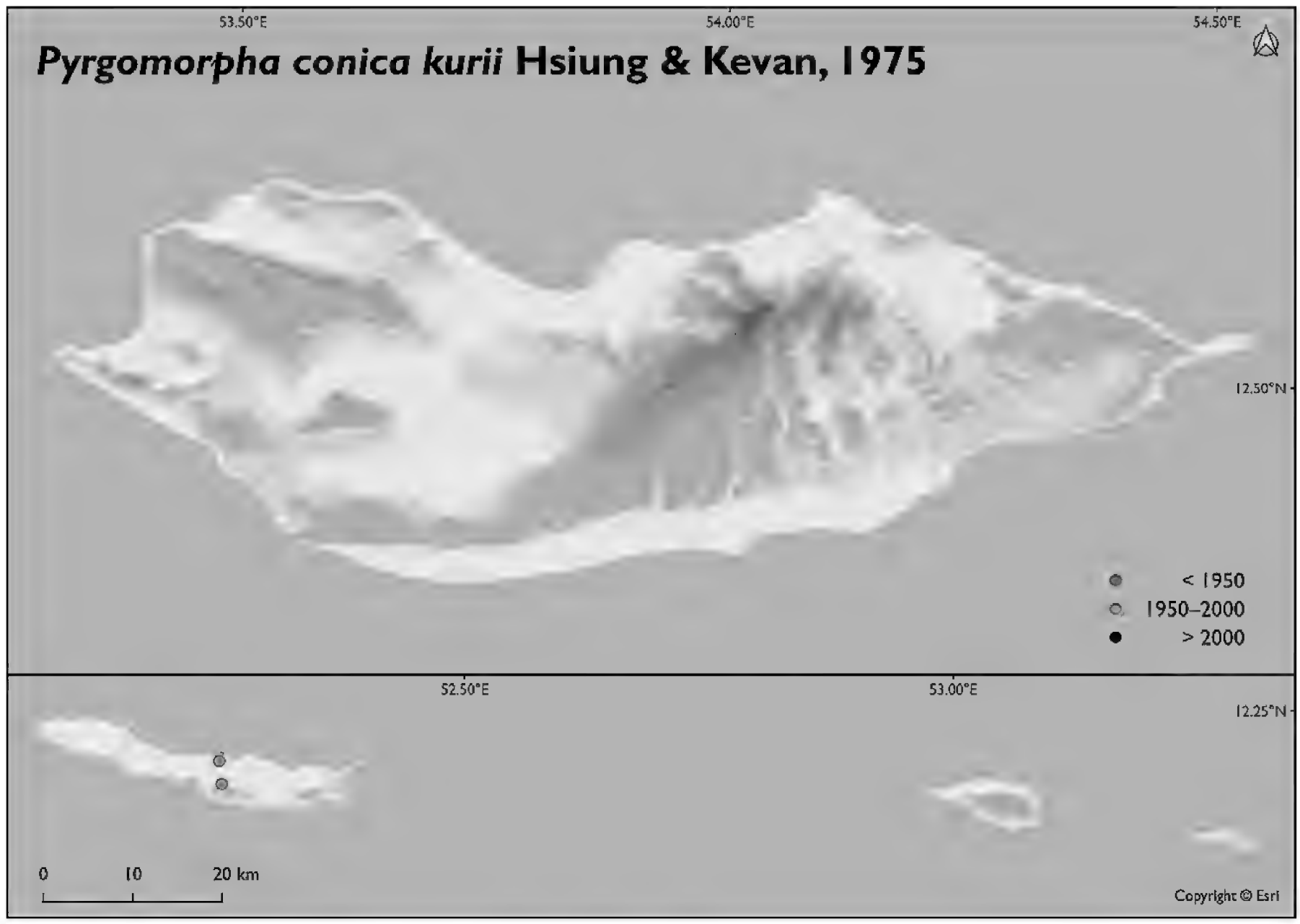

Figure 123. Distribution of *Pyrgomorpha conica kurii* Hsiung & Kevan, 1975 in the Socotra Archipelago.

Figure 124. *Pyrgomorpha tereticornis* (Brullé, 1840), copula. Momi Plateau, Socotra, 2 Nov 2010 (photograph Robert Ketelaar).

Taxonomic notes. *Pyrgomorpha tereticornis*, which has its type locality on the Canary Islands, is a member of the taxonomically complex *P. conica-bispinosa-cognata* group (Kevan 1974; Hsiung and Kevan 1975). This species group occurs in northern Africa, southern Europe and parts of Asia.

Kevan (1974) and Hsiung and Kevan (1975) considered *Pyrgomorpha tereticornis* a subspecies of *P. conica*. *Pyrgomorpha* specimens from Socotra studied by Hsiung and Kevan (1975) have been identified as this subspecies. However, their very long head characterises them compared to specimens from other parts of its range. Massa (2009) mentioned the small size of the Socotran specimens compared to specimens from the African continent. The sides of the female pronotum are less diverging posteriorly in the frontal than in the posterior half.

Default (2017, 2018) proposed to raise ssp. *tereticornis* to species level, based on a study of specimens from north-western Africa. At the same time, he did not exclude the possibility that, after molecular study, *tereticornis* will appear to be a subspecies of *P. conica* confined to the Canary Islands only, while the taxon on the African mainland should be named differently (Defaut 2017, 2018). However, OSF (Cigliano et al. 2024a) accepts the proposal of Defaut (2017, 2018) and considers *P. tereticornis* a full species.

In his study on *tereticornis*, Defaut (2017, 2018) did not incorporate material from eastern Africa and Socotra; his taxonomical suggestions are only attributed to north-western Africa. However, until further study, we here consider the Socotran taxon as *P. tereticornis*, following Hsiung and Kevan (1975).

Distribution and occurrence. The distribution area of *P. tereticornis*, according to Hsiung and Kevan (1975), comprises the Canary Islands, Cape Verde, northern Africa, Socotra and Southwest Asia. According to Defaut (2017), *P. tereticornis* tentatively occurs in Africa and the Middle East.

On Socotra, Popov found *P. tereticornis* widespread and uncommon in all drier parts (Popov in Uvarov and Popov (1957)). We found the species in 2009 and 2010 everywhere on the island at lower elevations (Fig. 125).

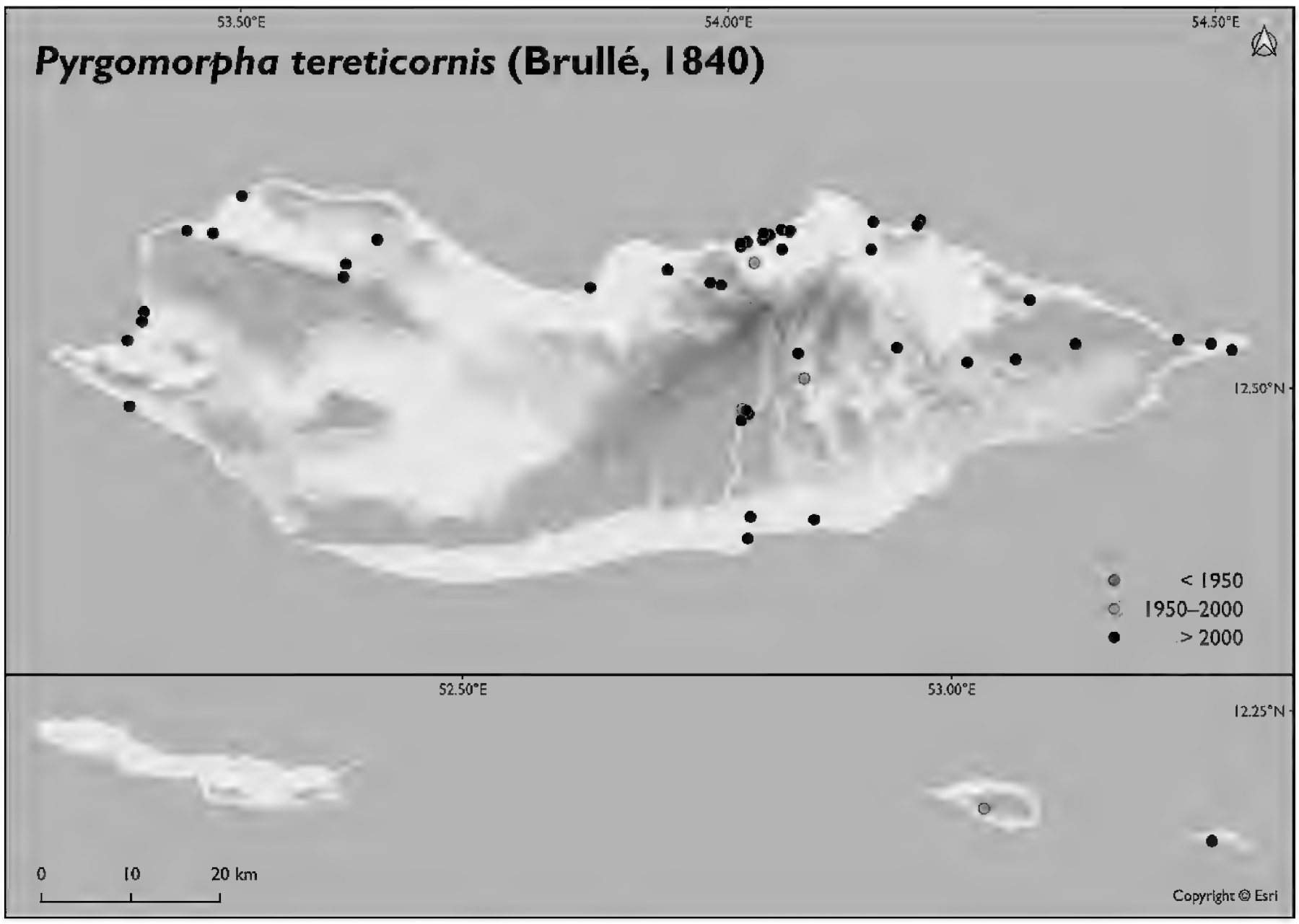

Figure 125. Distribution of *Pyrgomorpha tereticornis* (Brullé, 1840) in the Socotra Archipelago.

Figure 126. *Pyrgomorpha tereticornis* (Brullé, 1840), female. Wadi Ayhaft, Socotra, 26 Oct 2010 (photograph Robert Ketelaar).

Habitat and biology. In most regions of its extensive range, *P. tereticornis* occurs in steppe grassland and semi-desert (Hsiung and Kevan 1997). According to Popov (1997), who does not explicitly mention the situation on Socotra, *P. tereticornis* has a wide range of different habitats, from open coastal and inland plains and valleys with meso- and xerophytic vegetations consisting of low bushes, shrubs and annual plants to hillsides, wadis and croplands. This appears to summarise the Socotran situation better. In 2009 and 2010, we found it in various vegetation types at lower elevations from 5–500 m a.s.l. The species seems absent from the montane forests and mosaic of the Hagher. Records of adults as well as nymphs are from all months.

Sphenariini

Xenephias socotranus Kevan, 1973

Figs.127–129

References for Socotra. Kevan 1973: 1169–1173, figs 1, 2; Guichard 1992: 186; Popov 1997: 147–148, figs 76–78; Wranik 2003: 320, plate 154.

Diagnostic notes. *Xenephias socotranus* is a medium-sized, typical pyrgomorphid grasshopper with an elongated vertex, downward-facing frons, concave below the eyes and slightly flattened first antenna seg-

Figure 127. *Xenephias socotranus* Kevan, 1973, female nymph. Mount Skand, Socotra, Mar/Apr 2022 (photograph Kay van Damme).

ments (Fig. 128). It resembles a *Pyrgomorpha* species. but is entirely wingless, featuring a rugose body uniformly adorned with granules.

Taxonomic notes. Kevan (1973) considered *Xenephias* a member of the subtribus Sphenexiina, with *Sphenexia* Karsch, 1896 as its closest relative. The latter genus occurs in coastal forests in East Africa. According to Kevan (1973), this demonstrates the relation of the Socotran Orthoptera to the Ethiopian fauna, as Uvarov and Popov (1957) mentioned earlier.

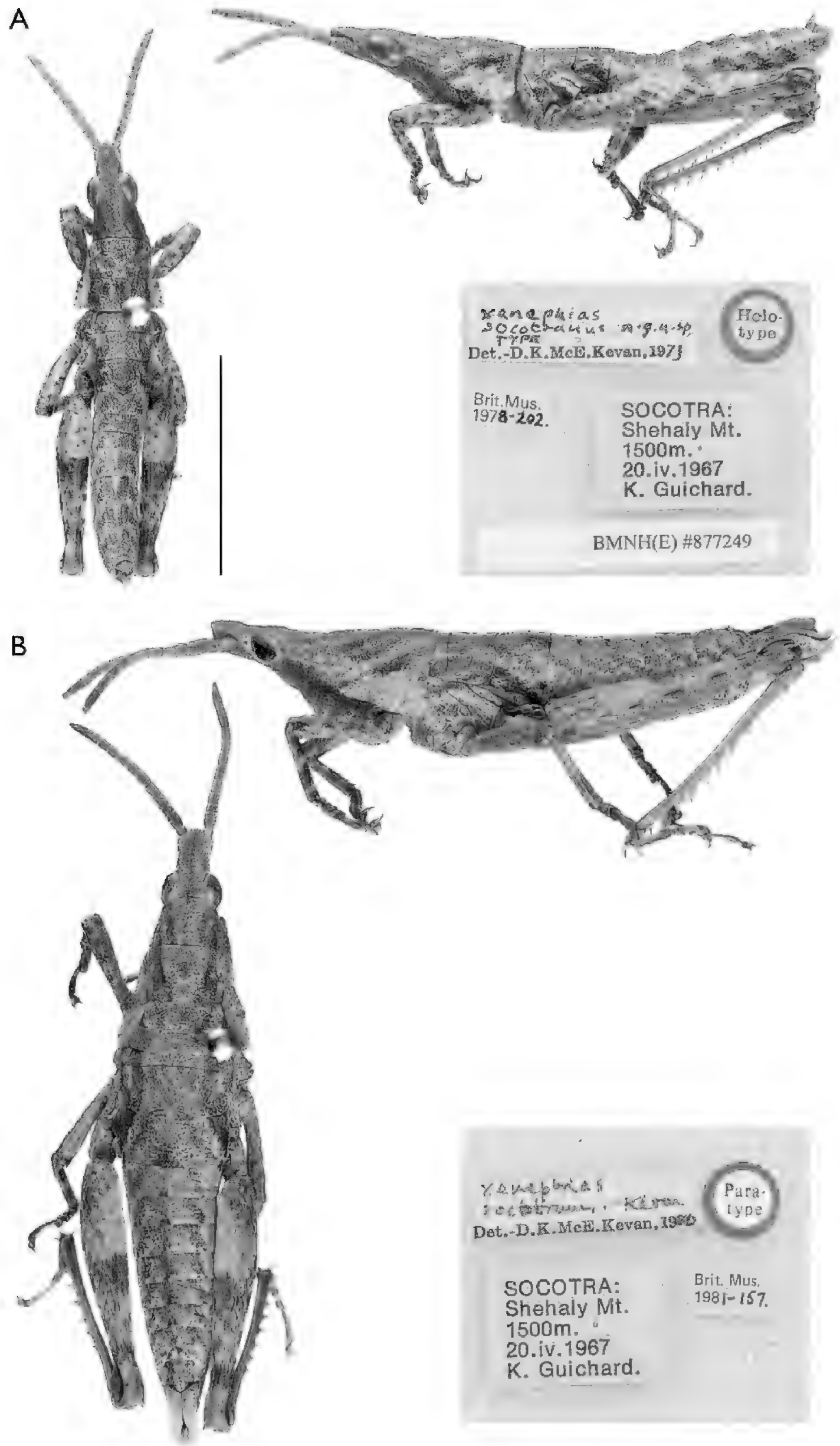

Figure 128. *Xenephias socotranus* Kevan, 1973, male, female, type specimens. **A.** Male holotype; **B.** female paratype. Collected on Mt. Shihali, Socotra, in 1967 by Kenneth Guichard. Scale bar: 1 cm (photograph Rob Felix).

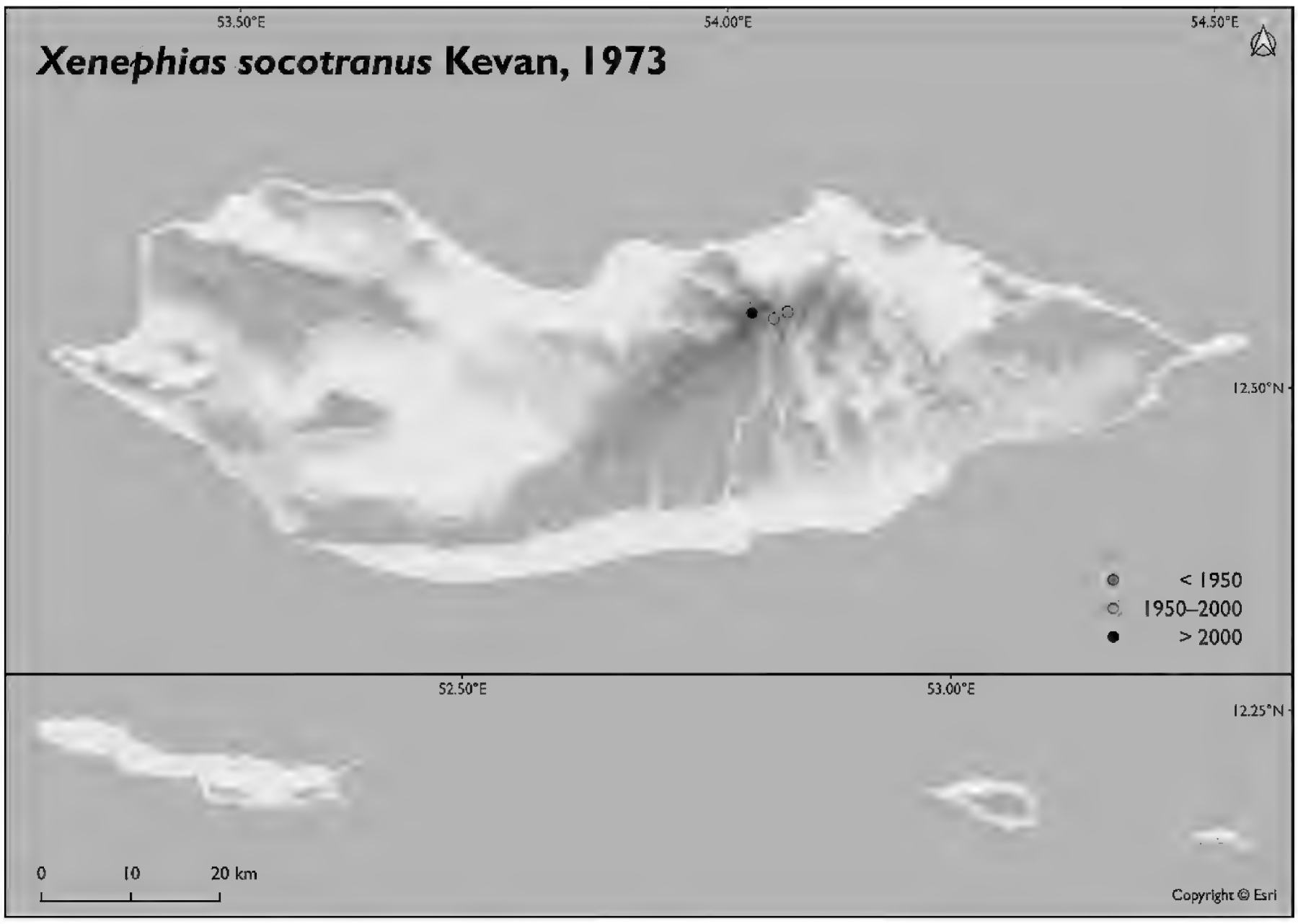

Figure 129. Distribution of *Xenephias socotranus* Kevan, 1973 in the Socotra Archipelago.

Distribution and occurrence. *Xenephias* is endemic to Socotra and only known from the highest elevations in the Hagher at Adho Dimello, the lower slopes of Mt. Shihali and Mt. Skand (Fig. 129). In Mar/Apr 2022, Kay van Damme and Francesca Pella (in litt.) observed a nymph at Mt. Skand (Fig. 127).

For remarks on Guichard's collecting site on Mt. Shihali on 20 April 1967, see the species account of *Dioscoridus depressus*.

Habitat and biology. The species strictly occurs above 1000 m a.s.l. in montane forests and shrubland. The only records are from March and April.

Tetrigoidea
Tetrigidae
Tetriginae

Paratettix subpustulatus (Walker, 1871)

Figs 130, 131

References for Socotra. Krauss 1907: 17, 18, 29 [as *Paratettix scaber*]; Uvarov (in Uvarov and Popov (1957)): 366 [as *Paratettix* sp.]; Wranik 2003: 318, plate 154 [as *Paratettix* sp.]; Massa 2009: 55–56; Devriese et al. 2023: 524–526.

Diagnostic notes. Members of Tetrigidae are amongst the smallest grasshoppers in the world. A long and pointed projection of the pronotum covers their abdomen. Tegmina are reduced to small, scale-like structures placed on the side of the body, while the hind wings are fully developed and can be very long, even projecting beyond the apex of the pronotum (Fig. 130). Nymphs can be separated from adults by the absence of tegmina and an uninterrupted keel over the hind femora at the knee level.

Paratettix species are characterised by a median carina of the pronotum ending just before it reaches the anterior margin of the pronotum. So far, *Paratettix subpustulatus* is the only tetrigid that occurs in the Archipelago. It can be separated from other members of the genus by its pale brown hind tibia without dark rings, straight borders of the middle femora and a straight carina on the hind femora (Devriese et al. 2023).

Taxonomic notes. The identity of the taxon present on Socotra has long been unclear. Hendrik Devriese identified

Figure 130. *Paratettix subpustulatus* (Walker, 1871), female. Adho Dimello, Socotra, 30 Oct 2010 (photograph Robert Ketelaar).

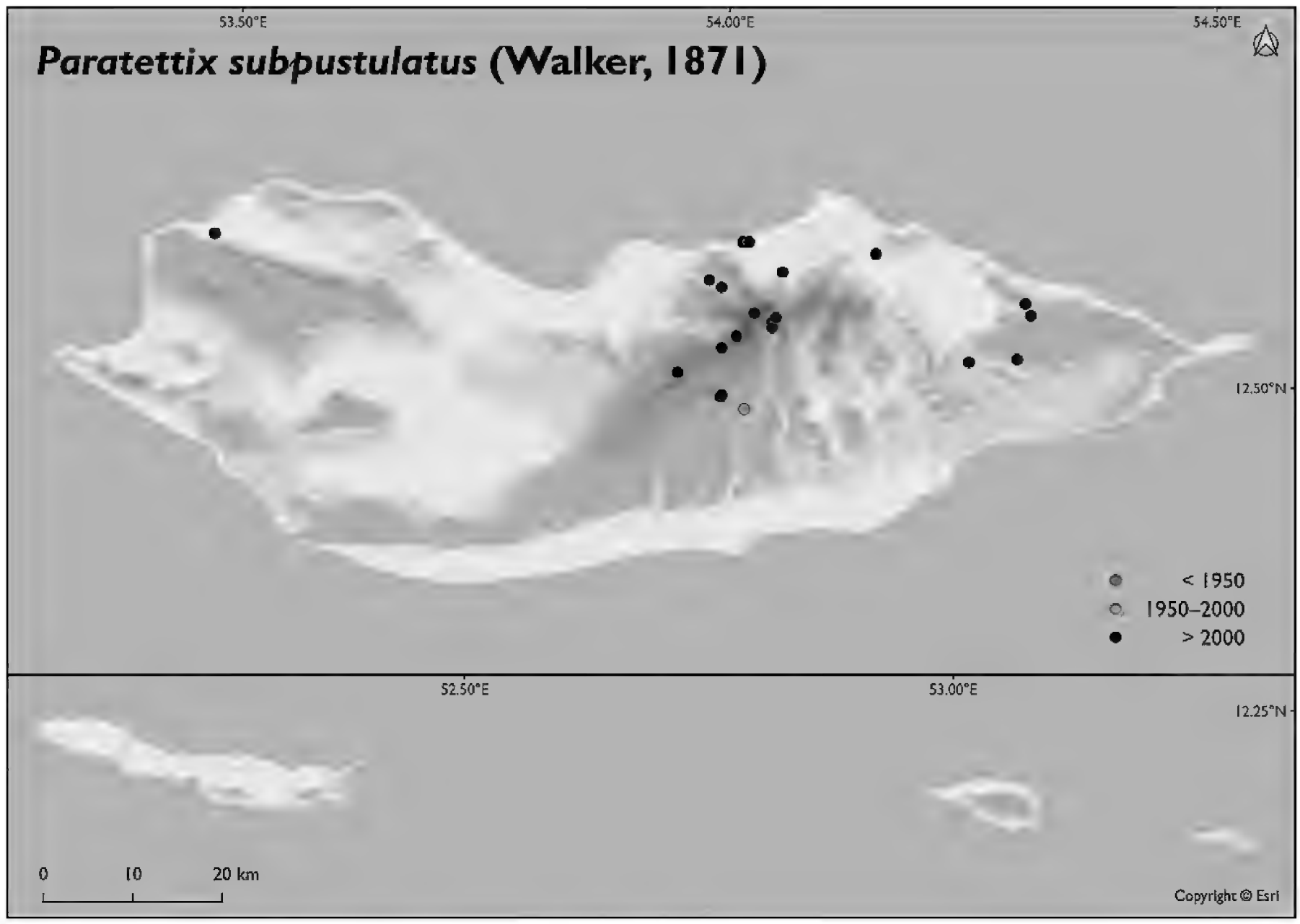

Figure 131. Distribution of *Paratettix subpustulatus* (Walker, 1871) in the Socotra Archipelago.

Tetrix specimens collected by Bruno Massa in 2008 as *Paratettix subpustulatus*, a widespread African species (Devriese in Massa 2009). Devriese also identified our specimens collected in 2009 as belonging to the same species (H. Devriese in litt.). In their revision of the African Tetrigini, Devriese et al. (2023) confirmed the identity of the Socotran tetrigid as *P. subpustulatus*. Other than the specimens examined by Devriese (Massa's and our material), the specimens mentioned in the material examined section have only been superficially examined by us.

Distribution and occurrence. *P. subpustulatus* is widely distributed in Africa south of the Sahara, Madagascar, the Comores and Socotra (Devriese et al. 2023). On Socotra, it is common, but because it prefers moist habitats, it is mainly restricted to the eastern half of Socotra (Fig. 131).

Habitat and biology. On Socotra, it can be found on moist soil, in wadis and wetlands, from 25–1450 m a.s.l. In 2009, the species was common along a stream in Wadi Ayhaft, in vegetation dominated by *Plantago amplexicaulis*. Records are from all seasons.

Ensifera
Grylloidea
Gryllidae
Gryllinae
Gryllini

Acheta cf. *A. domesticus* (Linnaeus, 1758)

Figs 132, 133

Figure 132. *Acheta* cf. *A. domesticus* (Linnaeus, 1758), female. Wadi Ayhaft, Socotra, 26 Oct 2010 (photograph Robert Ketelaar).

Diagnostic notes. Since only three female specimens are known, this taxon's identification on Socotra is uncertain. They are referred to here as *Acheta* cf. *A. domesticus*. Proper identification should be done, based on males' genitalia and bioacoustics.

Acheta domesticus is a medium-sized, yellowish-light brown cricket. In males, the tegmina cover two-thirds of the abdomen and contain four harp veins. The head is yellowish-brown, with two broad dark bands, one on the occiput and one between the eyes. Frons and clypeus are dark with a light central mushroom-shaped marking on the frons. The pronotum has a characteristic pattern of

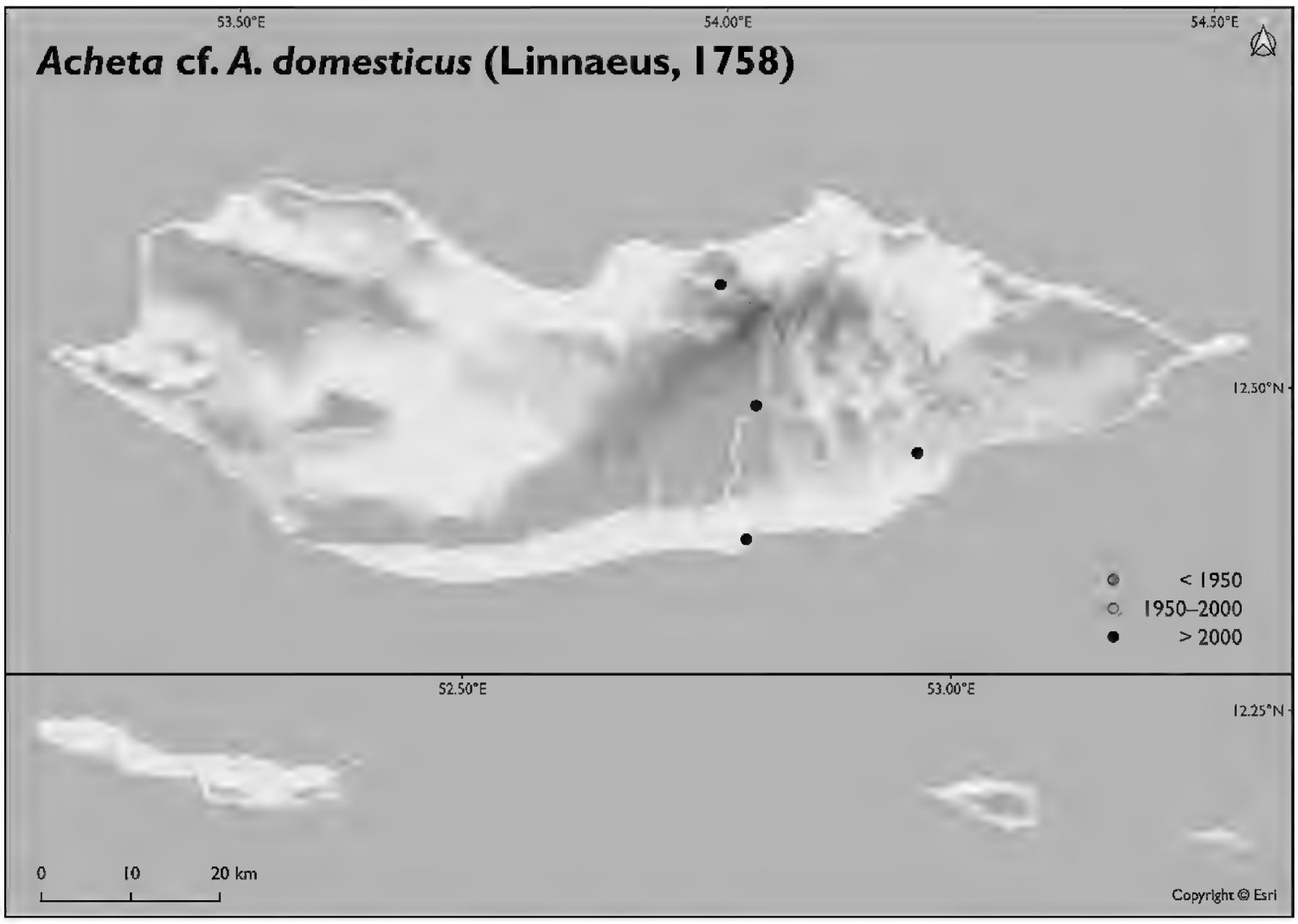

Figure 133. Distribution of *Acheta* cf. *domesticus* (Linnaeus, 1758) in the Socotra Archipelago.

three dark triangular markings; sometimes, the two lateral ones are divided, resulting in five spots.

Distribution and occurrence. *Acheta domesticus* is a synanthrope species with a worldwide distribution nowadays. Its original distribution area was presumably comprised of northern Africa, southern Europe and southwest Asia, which is comparable to other members of the genus (Gorochov and Llorente 2001). On Socotra, only three recent records of this presumed species are known, two in the southern coastal area and one in Wadi Ayhaft (Fig. 133).

Habitat and biology. One of the two specimens was found in a palm grove near a village and the other was found in a wadi, far from any urbanisation. Records are from April and October.

Bioacoustics. The song of *Acheta domesticus* is well known and consists of a repetition of short echemes (e.g. Baudewijn Odé, XC446402, accessible at https://www.xeno-canto.org/446402).

Acheta rufopictus Uvarov, 1957

Figs 134–138

References for Socotra. Burr 1903: 412, 422 [as *Gryllus lepidus*]; Uvarov (in Uvarov and Popov (1957)): 365–366; Chopard 1961: 271, plate IV; Gorochov 1993: 86; Wranik 2003: 316, plates 147, 149; Chintauan-Marquier et al. 2016: 57, 71; Massa et al. 2022: 10, 11, 16, 24.

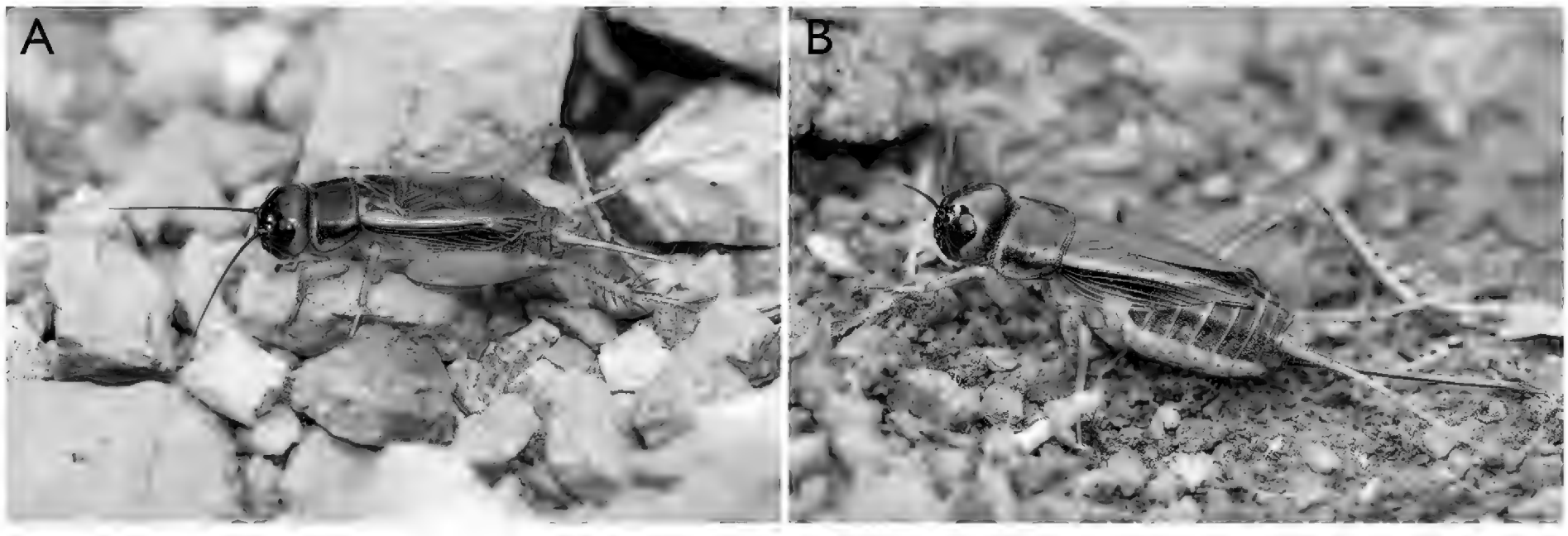

Figure 134. *Acheta rufopictus* Uvarov, 1957. **A.** Male; **B.** Female. Dineghen, Socotra, 30 Oct 2010 (photographs Robert Ketelaar).

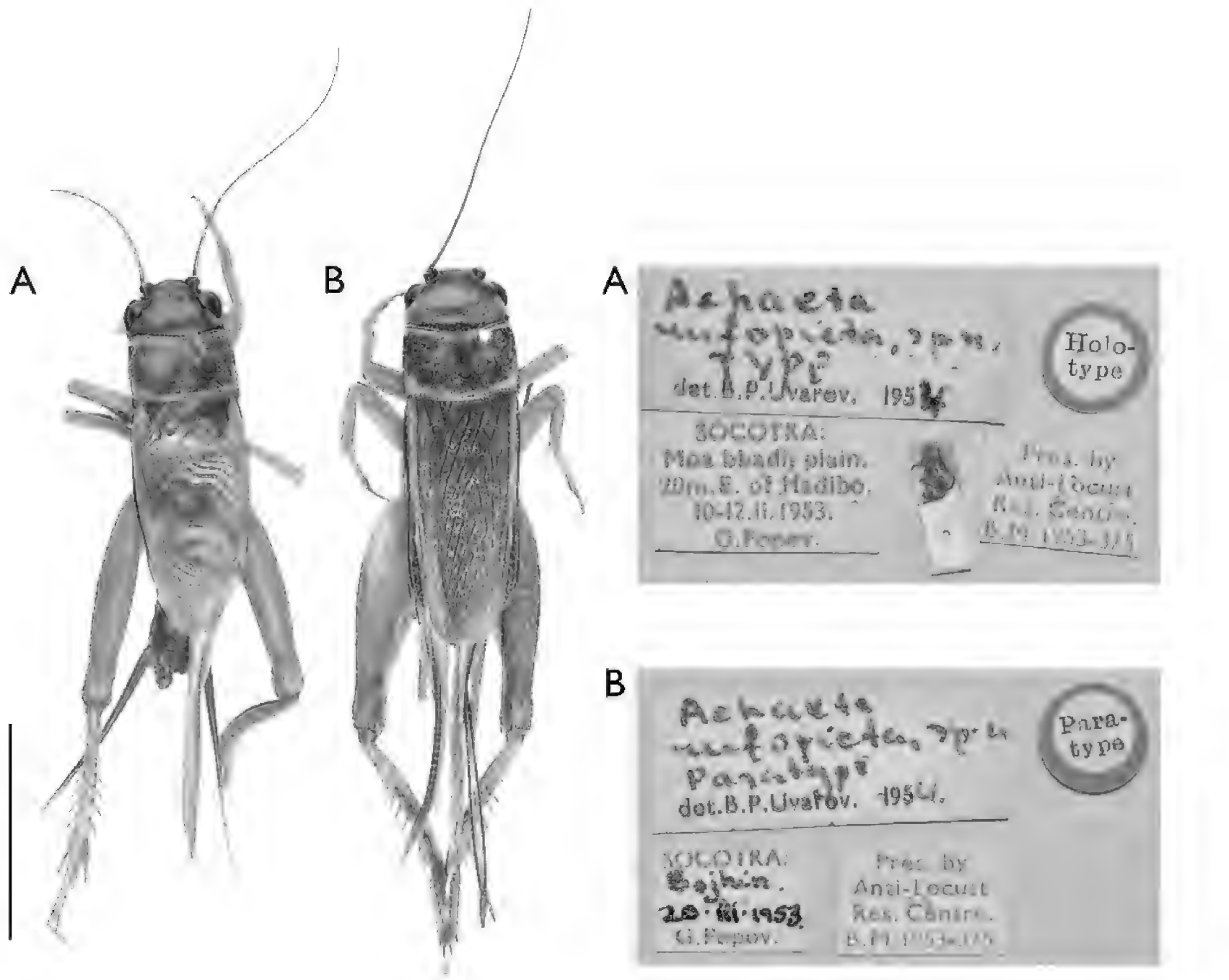

Figure 135. *Acheta rufopictus* Uvarov, 1957, male, female, type specimens. **A.** Male, holotype; **B.** Female, paratype. Scale bar: 1 cm (photograph Rob Felix).

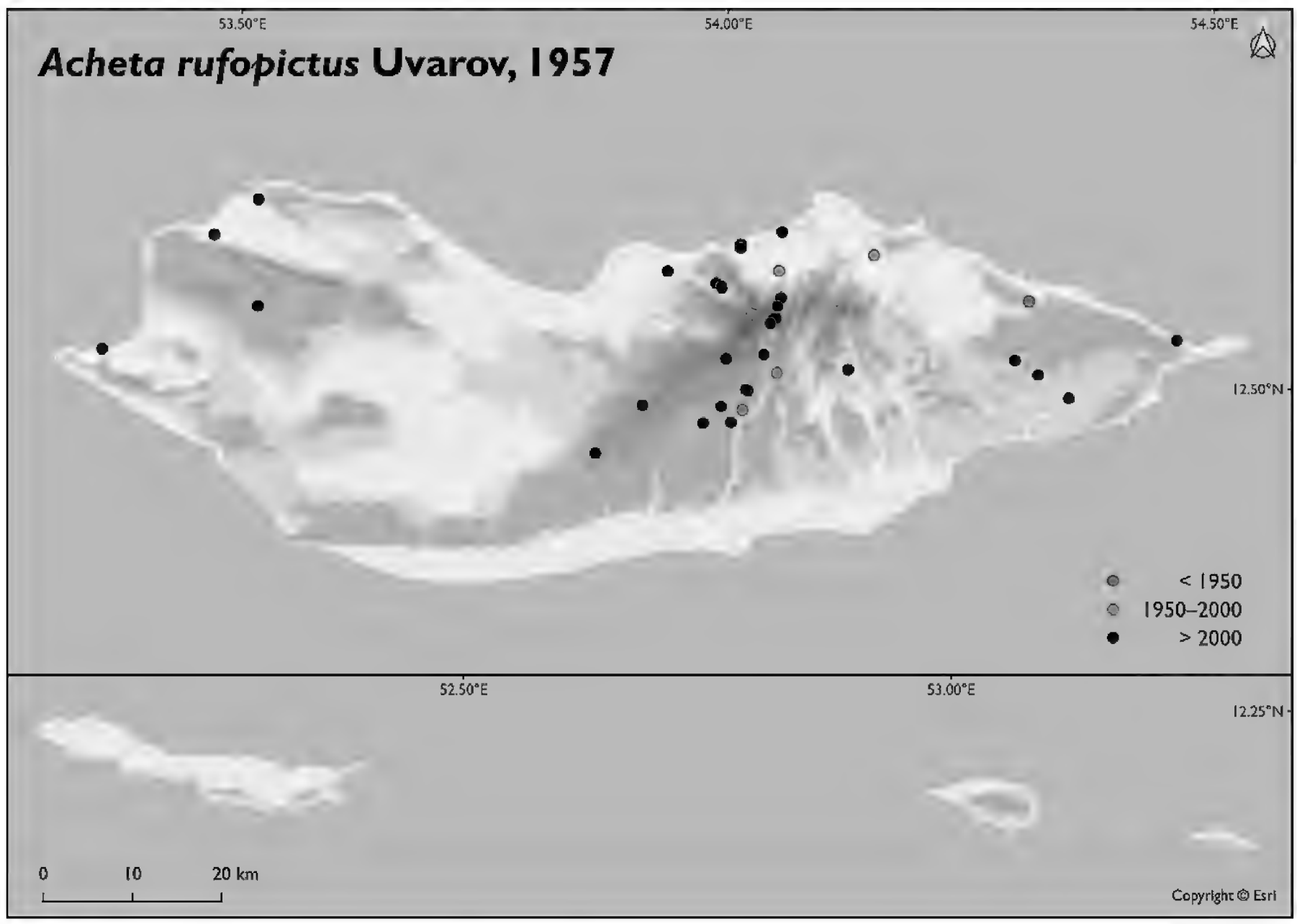

Figure 136. Distribution of *Acheta rufopictus* Uvarov, 1957 in the Socotra Archipelago.

Diagnostic notes. *Acheta rufopictus* is a medium-sized cricket with a relatively uniform dark body. Its head is dark reddish-brown to black, with only the median and lateral ocelli light and a light spot behind the eye (Figs 134, 135). The pronotum is uniformly blackish-brown on the disc, sometimes with a reddish hue and has a light hind margin and lateral lobes with a broadly yellowish margin. The tegmina have four harp veins. Legs are pale. Nymphs are strikingly patterned (Fig. 138).

Distribution and occurrence. Endemic to Socotra. The crickets are found throughout the island. In 2009 and 2010, the species was common in Ayhaft, Qeysoh, Adho Dimello, Begobig and various localities in Dixam (Fig. 136).

Habitat and biology. Found in almost all habitats, ranging from sandy plains, limestone plateaus and

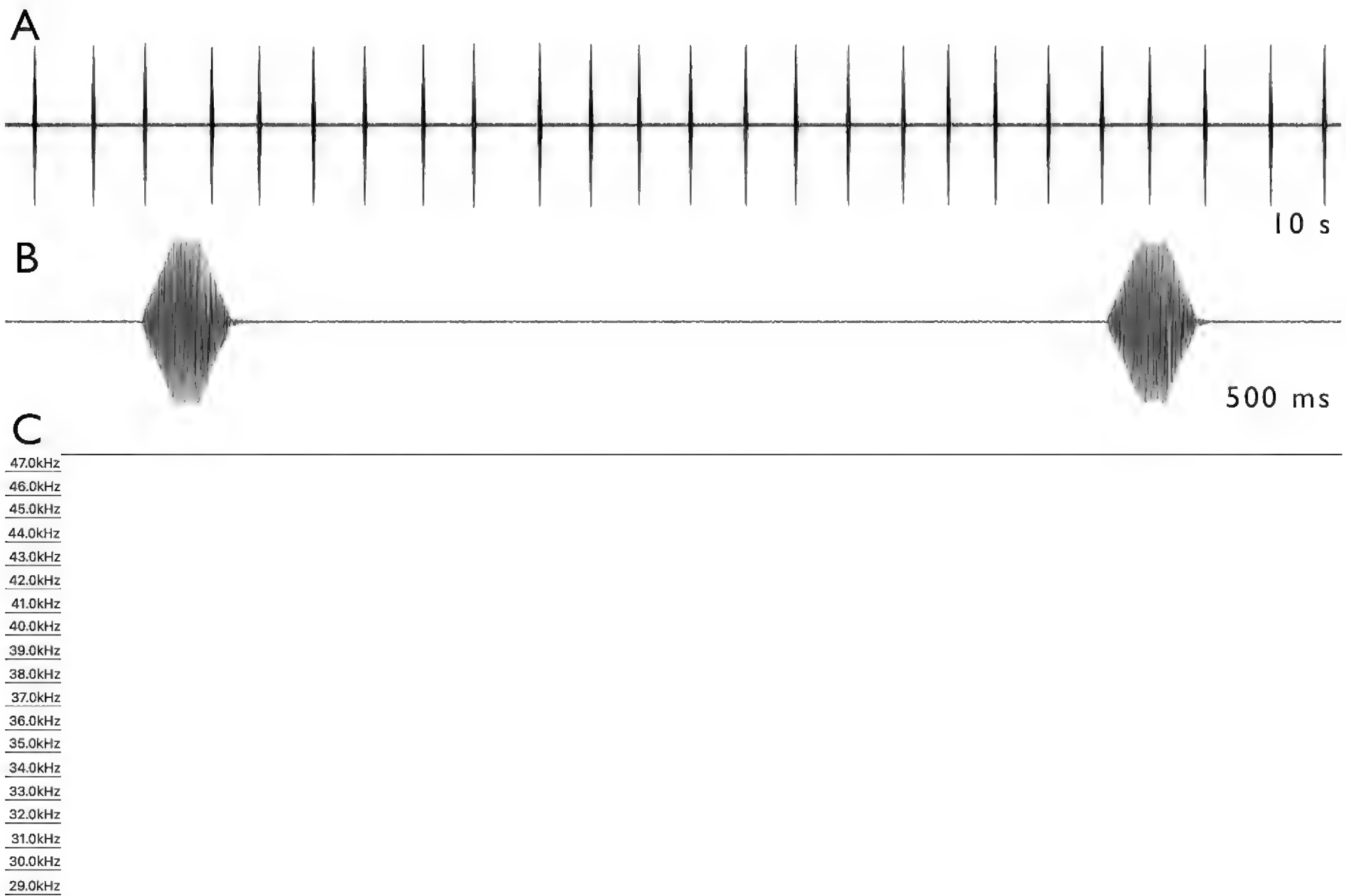

Figure 137. Calling song of *Acheta rufopictus* Uvarov, 1957. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Hadiboh, Socotra, 27 Oct 2010, 21:59 h; RecRF10104; SpRF10YE019; XC877940, accessible at https://www.xeno-canto.org/877940.

Figure 138. *Acheta rufopictus* Uvarov, 1957, male, nymph. In February 2024, these strikingly patterned nymphs were commonly observed on limestone plateaus by turning over large flat rocks during the day (photograph James Bailey).

urbanisation to montane shrub- and woodlands in the Hagher, from 0–1470 m a.s.l. Nocturnal and hiding by day in all kinds of crevices. Adults are present year-round.

Bioacoustics. The calling song of *Acheta rufopictus* is a simple syllable, more or less regularly repeated at a maximum rate of about 2.5 per second (Fig. 137; https://www.xeno-canto.org/877940). Syllable duration is about 35 ms. Only the closing hemisyllable produces sound. The carrier frequency of the song is around 5.4 kHz. The song has some harmonics at higher frequencies.

Remarks. Chintauan-Marquier et al. (2016) genetically analysed a male specimen from Ayhaft (26 Oct 2010). Sequences are stored in GenBank (KR904150.1; KR903964.1; KR903786.1; KR903623.1; KR903446.1; KR903272.1; KR903101.1).

Gryllodes sigillatus (Walker, 1869)

Figs 139–141

References for Socotra. Taschenberg 1883: 185 [as *Cophogryllus* sp.?]; Burr 1898: 385 [as *Landreva* sp. n.?]; Burr 1903: 412, 422 [as *Cophogryllus* sp.?]; Burr 1903: 412, 423 [as *Landreva* sp. n.?]; Krauss 1907: 30 [as *Cophogryllus* sp. and *Landreva* sp.]; Uvarov (in Uvarov and Popov (1957)): 365 [as *Cophogryllus* sp. and *Landreva* sp.]; Gorochov 1993: 82 [as *Gryllodes supplicans*]; Wranik 2003: 316, plates 147, 149 [as *Gryllodes supplicans*].

Diagnostic notes. *Gryllodes sigillatus* is a typical true cricket with a light brown colour, flattened body and a small head. Males have short, square wings ending halfway to the abdomen (Fig. 139). Females have tiny, reduced scaly wings. The head is light sandy with a broad dark line between the eyes. The pronotum has a characteristic dark hind margin.

Taxonomic notes. Amongst taxonomists, there is no unanimity about the status of *Gryllodes sigillatus* and *G. supplicans* (Walker, 1859). Otte (2006) considered both as valid species, based on genital morphology. This view is followed by many authors and is accepted by OSF (Cigliano et al. 2024a). On the other hand, *G. sigillatus* is treated as a junior synonym of *G. supplicans* by Chopard (1967), Kevan and Kevan (1995), Gorochov and Llorente (2001) and Gorochov (2017). Gorochov (1993) mentioned *G. supplicans* to be present on Socotra. Since we follow OSF, we chose to list the taxon present on Socotra as *G. sigillatus*.

Taschenberg (1883), Burr (1903), Krauss (1907) and Uvarov (in Uvarov and Popov (1957)) mentioned an unidentified cricket as *Cophogryllus* sp., collected by Riebeck in 1881. The museum in Halle (MLUH) sent a photo of this specimen, which depicts a *Gryllodes sigillatus* (confirmed by A. Gorochov in litt. 2022, as *G. supplicans*).

Burr (1898; 1903), Krauss (1907) and Uvarov (in Uvarov and Popov (1957)) mentioned another unidentified cricket *Landreva* sp., collected by Bennet in 1897. Burr (1898) gives a short description, but considers the specimen not good enough for description: "It is small, testaceous, with truncate tegmina and no wings. The tympanum is only visible on the exterior side of the anterior tibiae (subg. *Ectolandreva* Sauss.); the posterior tibiae are armed with five spines on each margin above and four terminal spines". Based on a photo from the Oxford Museum (OUMNH), this is also a *Gryllodes sigillatus* (A. Gorochov in litt. 2022).

Distribution and occurrence. *Gryllodes sigillatus* has a worldwide distribution and is widespread on Socotra (Fig. 140).

Habitat and biology. It is found in various habitats, ranging from sandy plains to shrubland and woodlands and not limited to urbanisation. Nocturnal and hiding by day in all kinds of crevices. Found from 0–1000 m a.s.l.

Bioacoustics. The calling song of *Gryllodes sigillatus* is an echeme, lasting about 50 ms and repeated at about 10 per second. Echemes consist of three syllables, the first shorter than the other two. The carrier frequency of the song is around 6.8–7.0 kHz and it has many harmonics at higher frequencies (Fig. 141; https://xeno-canto.org/877942).

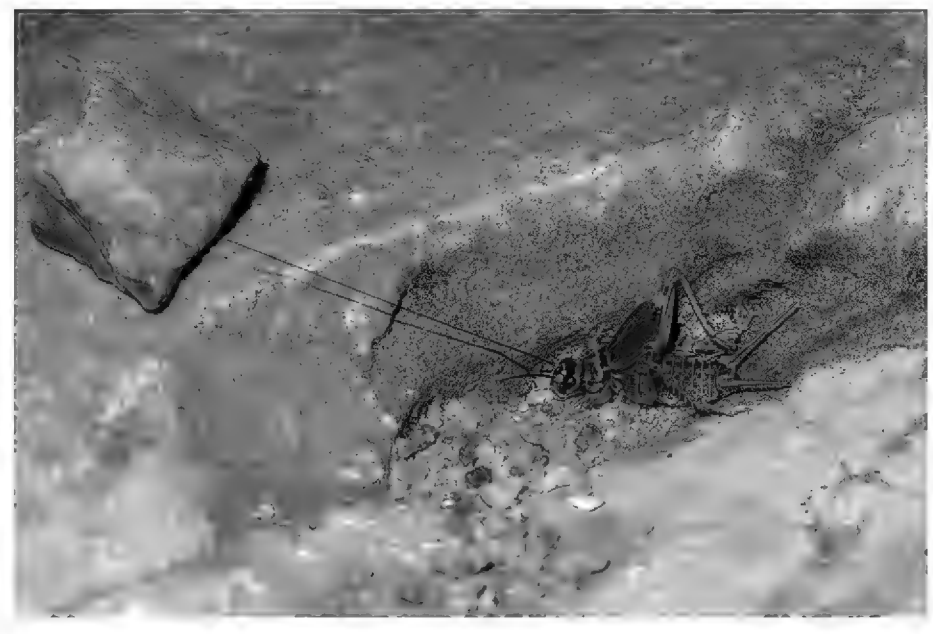

Figure 139. *Gryllodes sigillatus* (Walker, 1869), male singing. Wadi Ayhaft, 26 Oct 2010 (photograph Rob Felix).

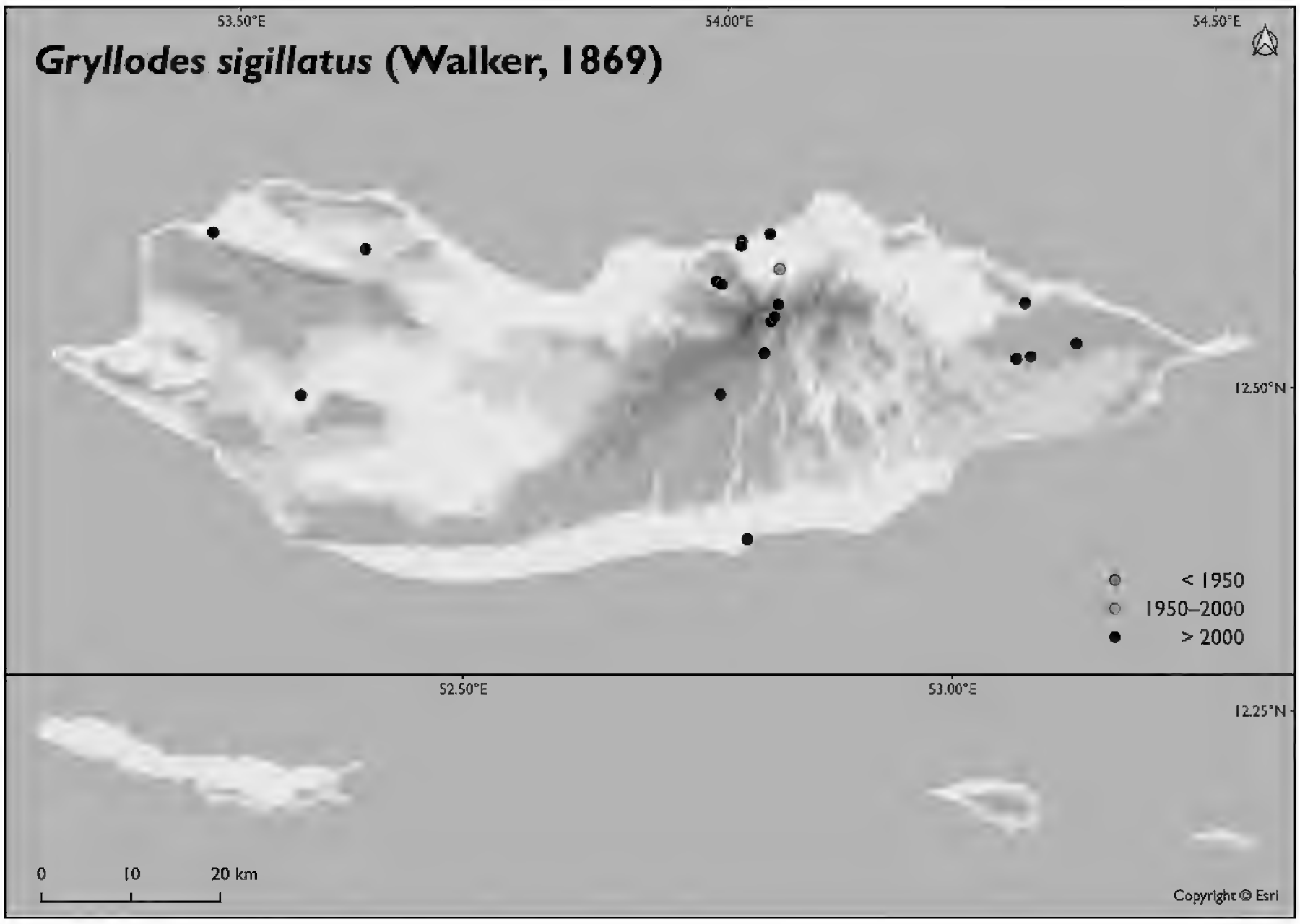

Figure 140. Distribution of *Gryllodes sigillatus* in the Socotra Archipelago.

Gryllus bimaculatus De Geer, 1773

Figs 142, 143

References for Socotra. Burr 1903: 412, 422 [as *Liogryllus bimaculatus*]; Wranik 2003: 315–316, plates 147, 149.

Diagnostic notes. *Gryllus bimaculatus* is a large pitch-black cricket with yellow markings at the base of the long tegmina. Its size and colouration make it an unmistakable species.

Distribution and occurrence. *Gryllus bimaculatus* is a widespread species in southern Europe, northern and eastern Africa and parts of Asia. It is known to swarm and cross large distances, also across open seas (Ragge 1972).

Only one ancient record (1899) is known from the island, while recent ones are numerous (Fig. 142). It could mean that the island has been colonised several times, with only the recent one being successful. In 2010, it was common in Ayhaft and Adho Dimello.

Habitat and biology. All kinds of habitats and vegetation types. Records from 20–1450 m a.s.l. The species is attracted by light (Adho Dimello, 30 Oct 2010).

Bioacoustics. The calling song of *Gryllus bimaculatus* is an echeme, lasting about 100 ms and repeated at about 4–5 per second (Fig. 143; https://xeno-canto.org/877943). Echemes consist of three (rarely two) syllables of more or less equal duration and loudness. The carrier frequency of the song is around 4.7–4.8 kHz and has many harmonics at higher frequencies.

Modicogryllini

Eumodicogryllus chivensis (Tarbinsky, 1930)

Figs 144–147

Diagnostic notes. With less than 1 cm, *E. chivensis* is a relatively small member of the true crickets on Socotra. It is characterised by a light brown, sandy colour, six faint longitudinal stripes on the occiput and a strongly curved epistomal suture between the antennae, forming an almost right angle with a sharp apex (Fig. 144). The latter character is diagnostic for the genus *Eumodicogryllus*, compared to *Modicogryllus*. The tegmina have two harp veins.

The pseudepiphallus forms a curved plate with a distinct wedge-shaped notch in its posterior margin, giving it a bifurcated appearance. In the middle, it has a characteristic transverse fold. Its main lateral lobes are pointed apically (Fig. 145).

We identified our specimens from Socotra as *E. chivensis*, based on its phallic structure (Fig. 145) and head pattern by comparing the illustrations in Gorochov (1978). We also used the key in Gorochov (1978) and the species description in Tarbinsky (1930). Our specimens seem relatively small compared to the holotype, based on the morphometrics mentioned by Tarbinsky (1930) (Table 5).

Taxonomic notes. Tarbinsky (1930) described *Gryllus chivensis* as follows: "*Lower part of face distinctly rounded in profile; lower frontal margin forms a strongly*

angularly inflexed line; frons under the middle ocellus with transverse brown spot separated from the other, upper, brownish part of the head, by a yellow stripe, very narrow in the middle. Occiput with indistinct narrow longitudinal yellow stripes. Lateral lobes of the pronotum with a short brown stripe reaching neither the hind nor the anterior margins. Tegmina of males and females are unicolourous; in females, they are one and a half times longer than the pronotum with a roundly prominent apex. The apex is somewhat tapering in males, with a broad apical field. Ovipositor longer than hind femora".

Chopard (1961) moved *Gryllus chivensis* Tarbinsky, 1930, amongst many other taxa, to his newly-erected genus *Modicogryllus* Chopard, 1961. Gorochov (1978)

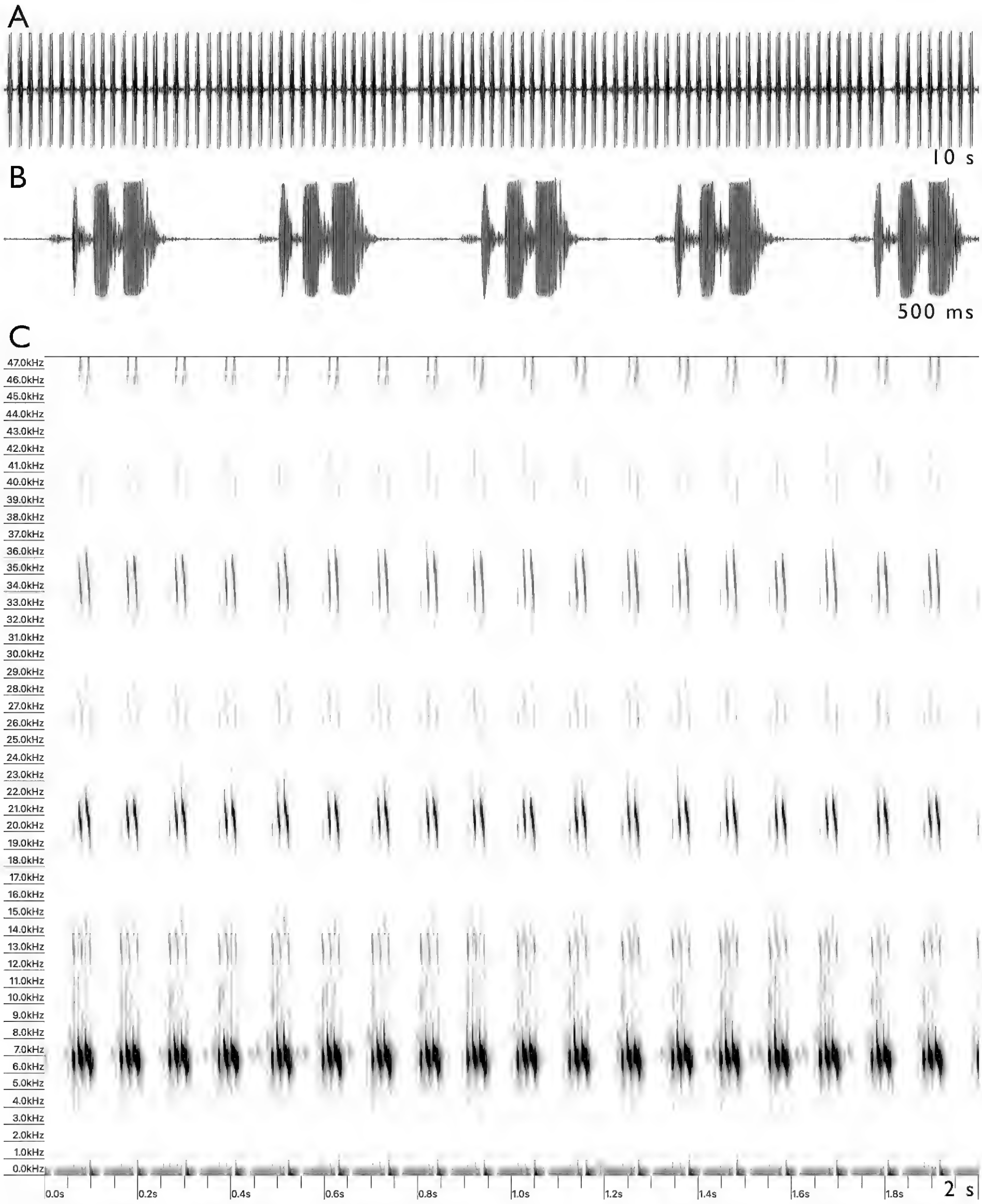

Figure 141. Calling song of *Gryllodes sigillatus* (Walker, 1869). Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Ayhaft, Socotra, 26 Oct 2010, 19:58 h; RecRF10093; XC877942, accessible at https://www.xeno-canto.org/877942.

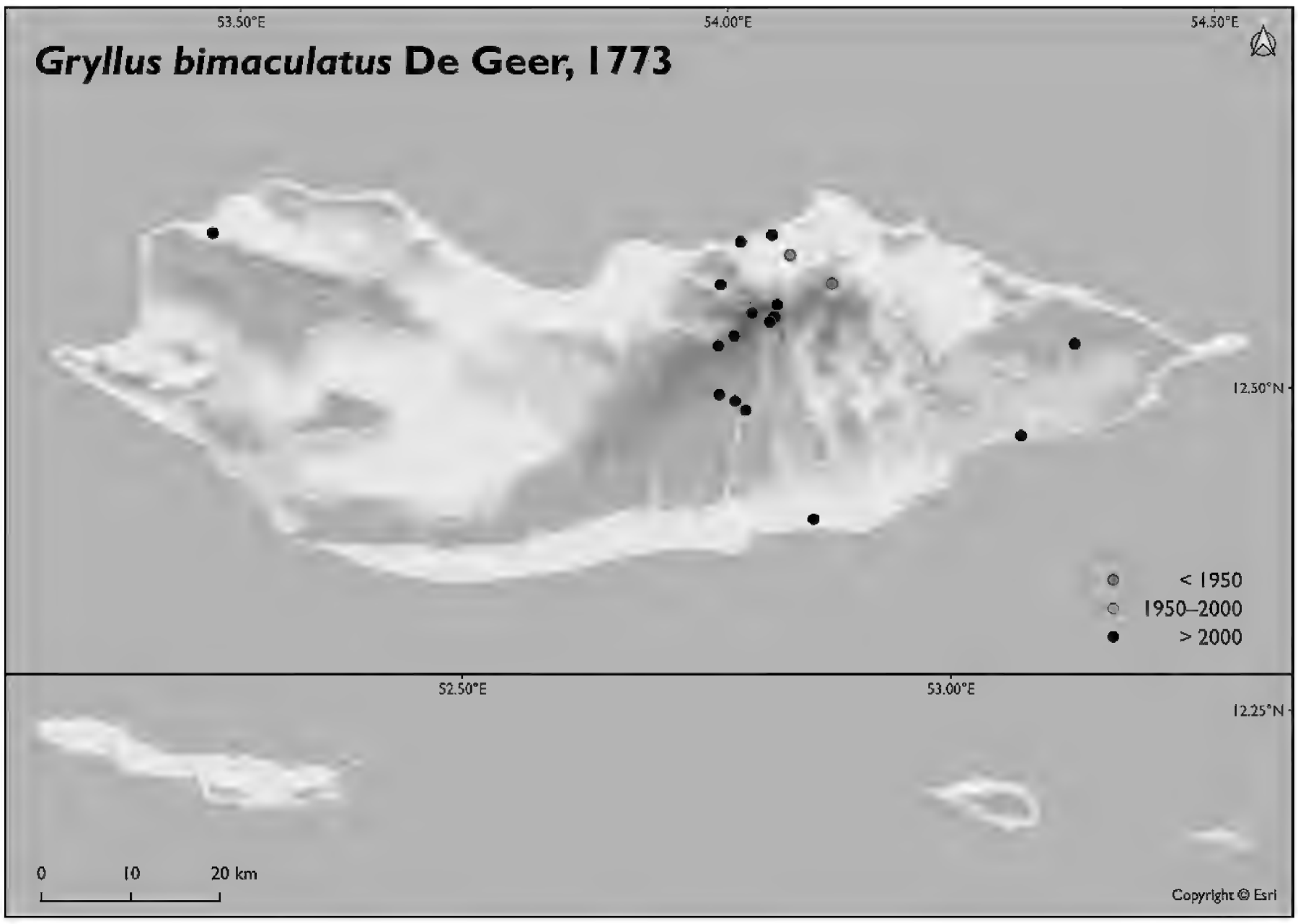

Figure 142. Distribution of *Gryllus bimaculatus* De Geer, 1773 in the Socotra Archipelago.

Table 5. Morphometrics of male *Eumodicogryllus chivensis* (Tarbinksy, 1930). Measurements of the holotype are taken from the original species description.

Parameters	Male holotype	Male Socotra (n = 2)
Total length (frons–subgenital plate)	12.0 mm	9.2–9.5 mm
Length hind femur	7.3 mm	5.7–6.3 mm
Length pronotum	2.1 mm	1.7–1.8 mm
Length tegmen	6.0 mm	5.0–5.2 mm

distinguished three groups within this genus, based on the shape of the male genitalia and the curvation of the epistomal suture. One group was formed by *M. bordigalensis* and *M. chivensis*, for which Gorochov (1986) later erected the subgenus *Eumodicogryllus*, designating *M. bordigalensis* as the type species. In 1993, Gorochov elevated *Eumodicogryllus* to the genus level without further explanation, which was noted and subsequently accepted by Coray and Lehmann (1998).

The genus *Eumodicogryllus* contains five species (Cigliano et al. 2024a): *E. bordigalensis* (Latreille, 1804), *E. chinensis* (Weber, 1801), *E. chivensis*, *E. theryi* (Chopard, 1943) and *E. vicinus* (Chopard, 1968).

Recently, Ma et al. (2021) erroneously synonymised *E. chivensis* and *E. bordigalensis* with *E. chinensis*. They stated that Chopard (1967) made a mistake when synonymising *E. chinensis* with *E. bordigalensis* and claimed that, based on the principle of priority, the senior synonym should be *E. chinensis* instead of *E. bordigalensis*.

Chopard (1967), however, did not synonymise *E. chinensis* with *E. bordigalensis*. He only considered the specimens formerly identified as *chinensis* by several authors as belonging to *E. bordigalensis*. He kept *E. chinensis* as a valid species by mentioning "*chinensis* (*nec* Weber)". Harz (1969) agreed on this.

Ma et al. (2021) synonymised *E. chivensis* with *E. bordigalensis* mainly because they found "*E. bordigalensis* and *E. chivensis* to be very similar". They referred to the illustrations of the phallic structure of both species in Gorochov (1978). They stated they "could find those two types of male genitalia in specimens collected in China". These arguments are too weak for synonymising two species widely accepted for decennia and OSF does not accept this proposed synonymy (Cigliano et al. 2024a).

We compared the male genitalia of a specimen from Socotra with a specimen of *E. bordigalensis* from Italy and found several differences. The phallic structure of *E. chivensis* from Socotra is much smaller than the one from *E. bordigalensis*, with a width of the pseudepiphallus of 0.6 mm and 1.0 mm, respectively. There is also a difference in the shape of the pseudepiphallus. In *E. chivensis*, the wedge-shaped notch in the posterior margin of the pseudepiphallus is more profound and broader than in *E. bordigalensis*; as a result, the mean (lateral) lobes of the pseudepiphallus are more slender, corresponding to the illustration in Gorochov (1978). Finally, the songs of both species differ.

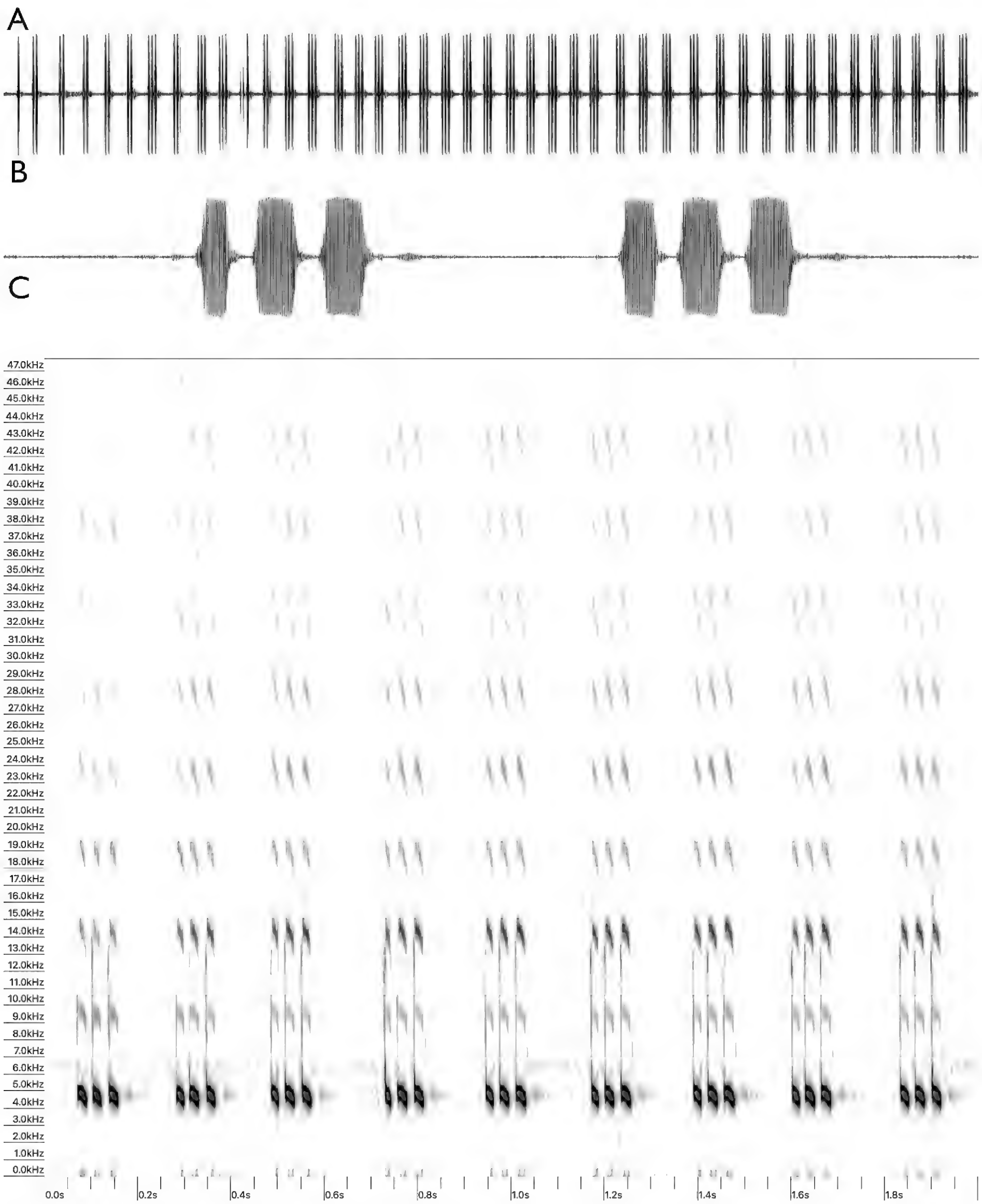

Figure 143. Calling song of *Gryllus bimaculatus* De Geer, 1773. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Ayhaft, Socotra, 26 Oct 2010, 21:45 h; RecRF10103; XC877943, accessible at https://www.xeno-canto.org/877943.

Distribution and occurrence. *E. chivensis* was described from Ak-Mechet, near Khiva, in modern Uzbekistan (not Khazachstan as indicated by OSF). It is known from Oman and Saudi Arabia (Gorochov 1993), the United Arab Emirates (Gorochov 2017) and China (Ma et al. 2021). It is new for Socotra and is only known from three specimens at Neet (Fig. 146).

Habitat and biology. In Central Asia, *E. chivensis* occurs in semi-deserts near salt lakes (Gorochov 2017). On Socotra, it was found in a sandy habitat with salt marsh

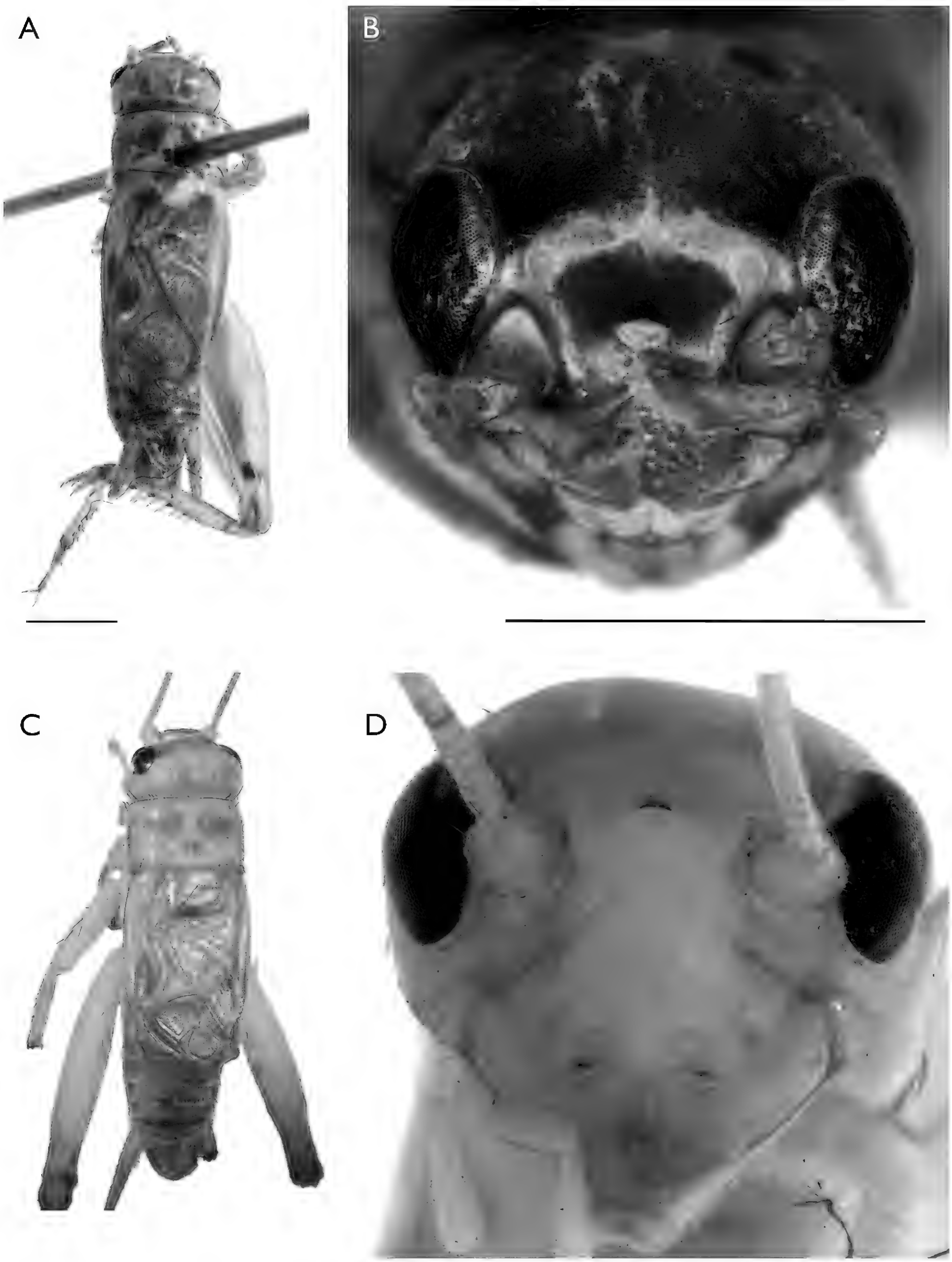

Figure 144. *Eumodicogryllus chivensis* (Tarbinsky 1930), males. Neet, Socotra, 28 Oct 2010. **A**, **C.** Habitus; **B**, **D.** Head. The epistomal suture is visible (**D**), showing a right angle and pointed apex between the antennae, characteristic of the genus. In the second specimen (**C, D**), the colours have faded by ethanol. **A, B.** SpRF10YE025; **C, D.** SpRF10YE034. Scale bars: 2 mm (photographs Roy Kleukers, Luc Willemse).

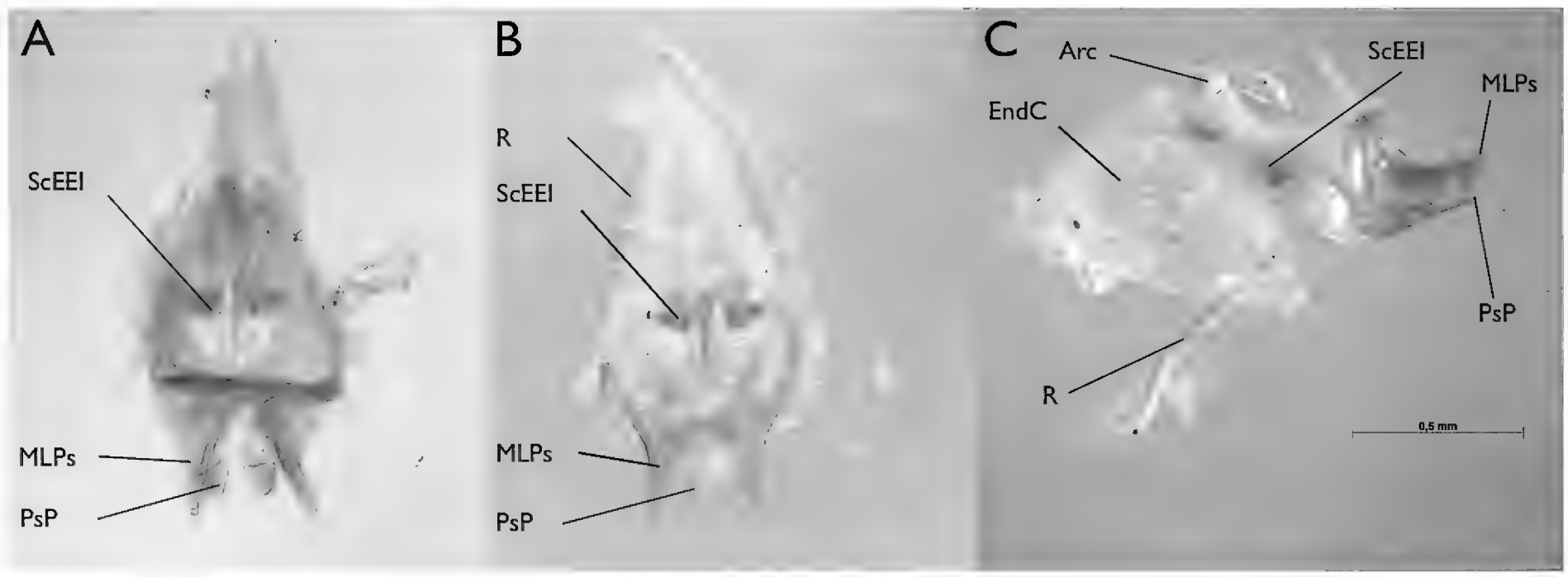

Figure 145. *Eumodicogryllus chivensis* (Tarbinsky, 1930), phallic complex of male. Neet, Socotra, 28 Oct 2010. **A.** Dorsal view, anterior end on top; **B.** Ventral view; **C.** Lateral view, anterior end on the left. Abbreviations: EctF: Ectophallic Fold; EndC: Endophallic Cavity; MLPs: Main Lobes of the Pseudepiphallus; PsP: Pseudepiphallic Parameres; R: Ramus; ScEEI.: Lateral Sclerotisation of the Epi-Ectophallic Invagination; SpRF10YE034; Scale bar: 0.5 mm (photograph Rob Felix).

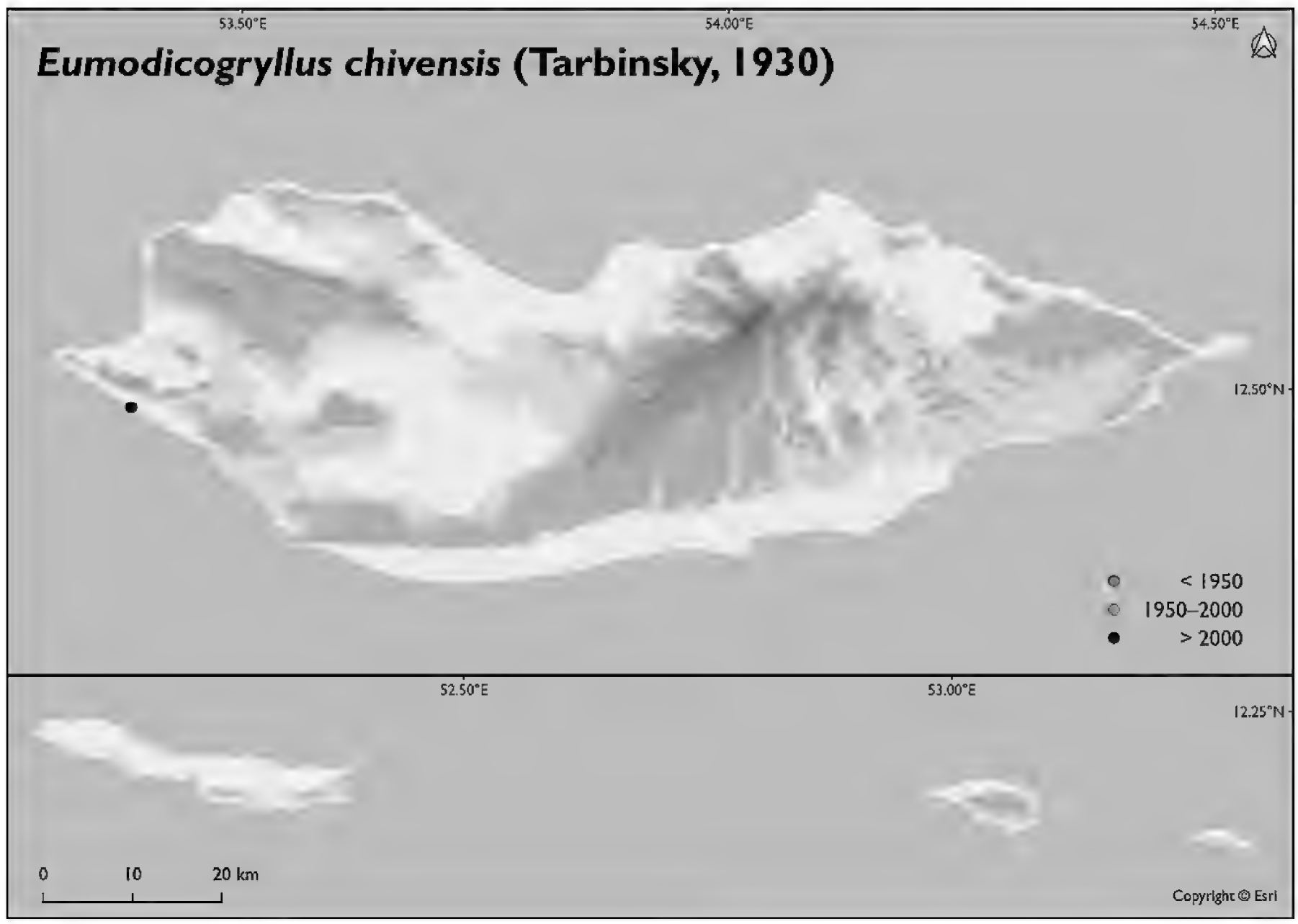

Figure 146. Distribution of *Eumodicogryllus chivensis* (Tarbinksy, 1930) in the Socotra Archipelago.

vegetation behind the first row of dunes at 2 m a.s.l. (Fig. 2). The crickets were calling from the entrances of small holes in the ground.

Bioacoustics. The calling song of *Eumodicogryllus chivensis* is an echeme, repeated at the rate of about 3–4 per second, lasting 70–120 ms, produced in continuous series or broken up in groups of 2–15 (Fig. 147A). Echemes consist of 9–11 syllables of more or less equal duration, repeated at 110–120 per second (Fig. 147B). Usually, the first one or two syllables are quieter and are repeated at a lower rate. The carrier frequency of the song is around 7.7–8.0 kHz and the song has few harmonics at higher frequencies (https://www.xeno-canto.org/877946).

The song is markedly different from *E. bordigalensis*, as the song of that species has echemes with 14–20 syllables repeated at about 40–60 per second. Additionally, the carrier frequency in *E. bordigalensis* is much lower (Ragge and Reynolds 1998).

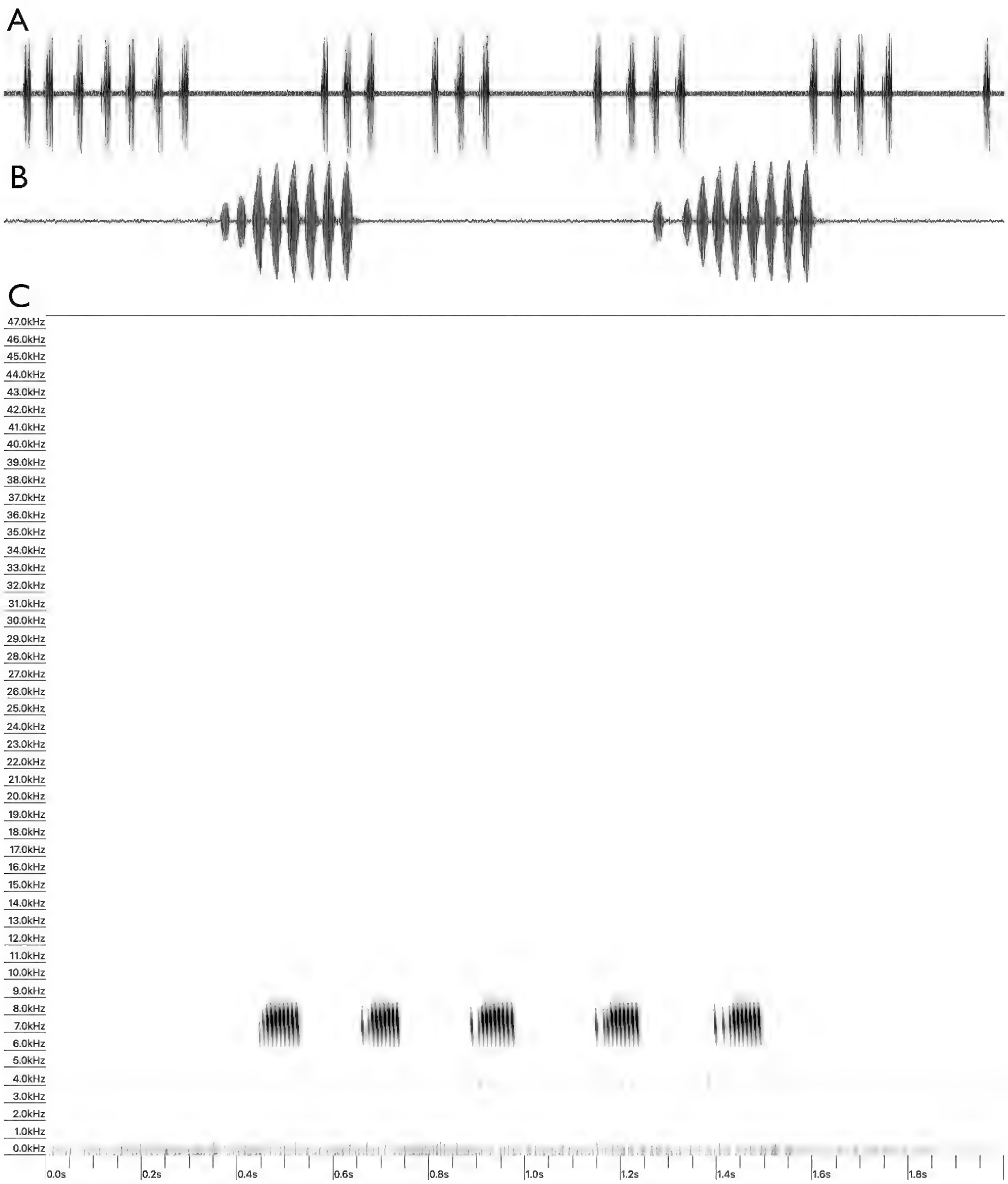

Figure 147. Calling song of *Eumodicogryllus chivensis* (Tarbinksy, 1930). Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Neet, Socotra, 28 Oct 2010, 20:39 h; RecRF10118; SpRF10YE034; XC877946, accessible at https://www.xeno-canto.org/877946.

Modicogryllus perplexus Otte & Cade, 1984

Figs 148–151

References for Socotra. Gorochov 1993: 87; Wranik 2003: 316, plate 149.

Diagnostic notes. *Modicogryllus perplexus* is a medium-sized, dark-brown cricket (Fig. 148). It is slightly larger than *Eumodicogryllus chivensis* and much darker overall. It has six clear longitudinal stripes on the occiput and vertex, sometimes with a thin median line. The frons has a narrow pale line connecting the lateral ocelli. The epistomal suture is slightly curved, with an obtuse angle and a rounded apex (difference with *Eumodicogryllus*). The tegmina have two harp veins.

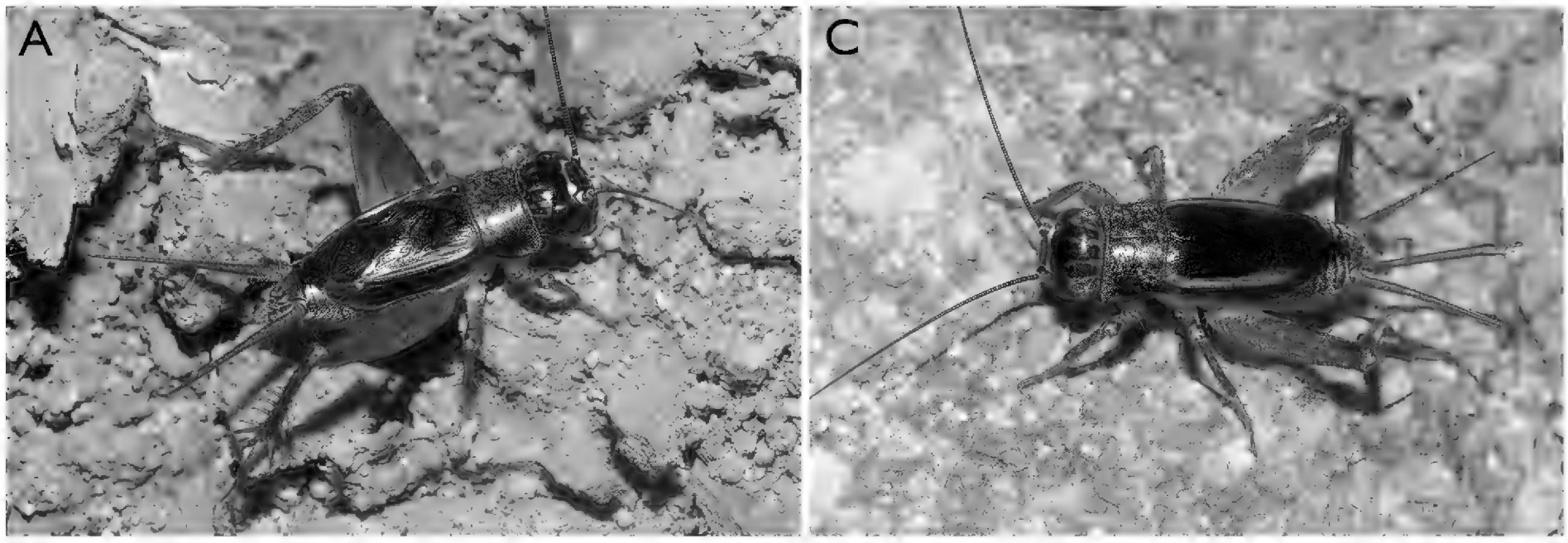

Figure 148. *Modicogryllus perplexus* Otte & Cade, 1984, male, female. **A.** Male; **B.** Female. Adho Dimello, Socotra, 31 Jan 2024 (photographs James Bailey).

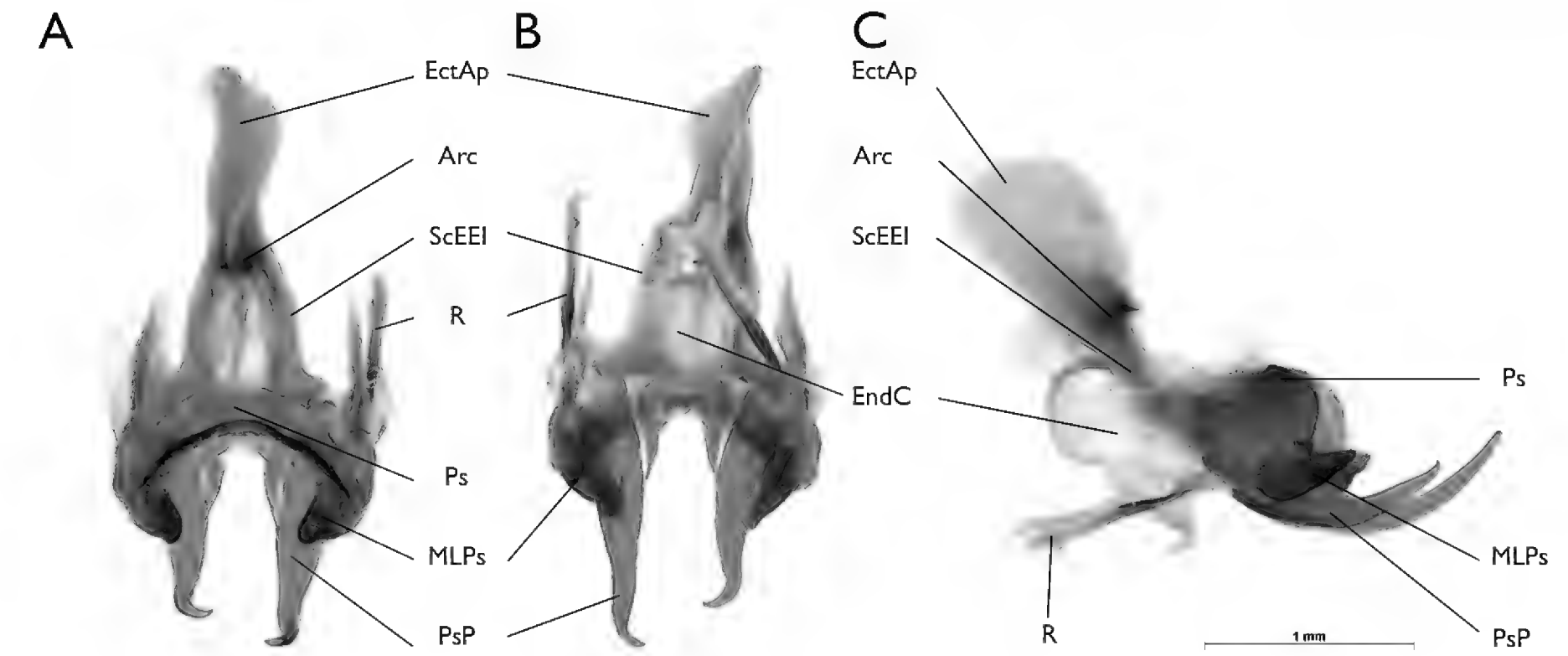

Figure 149. *Modicogryllus perplexus* Otte & Cade, 1984, male phallic complex. Qeysoh, Socotra, 28 Feb 2009. **A.** Dorsal view, anterior end on top; **B.** Ventral view; **C.** Lateral view, anterior end on the left. Abbreviations: EctAp: Ectophallic Apodeme; EndC: Endophallic Cavity; MLPs: Main Lobes of the Pseudepiphallus; Ps: Pseudepiphallus; PsP: Pseudepiphallic Parameres; R: Ramus; ScEEI: Lateral Sclerotisation of the Epi-Ectophallic Invagination; SpRF09YE320; Scale bar: 1 mm (photographs Yvonne van Dam and Rob Felix).

Table 6. Morphometrics of *Modicogryllus perplexus* Otte & Cade, 1984. Data are from the type specimens from South Africa (SA), published in Otte and Cade (1984) and specimens collected on Socotra in 2009 and 2010.

Specimens	No. teeth file	Body length	Ratio tegmen length/ pronotum length	No. subapical spurs	
Males				inner	outer
Type specimens SA (n = 6)	98–117 (117)	12.5–13.5 mm	3.7	5–6	6
Socotran specimens (n = 2)	Not determined	11.1–12.7 mm	3.4	5–6	6
Females					
Type specimen SA (n = 2)		12.0–13.5 mm	3.0–3.3	5	6
Socotran specimens (n = 4)		10.4–11.7 mm	2.4–2.6	5–6	6

The pseudepiphallus has the shape of a bridge (Fig. 149). The main lobes of the pseudepiphallus (MLPs) are thick and short, with an obtuse apex curved inwards. The pseudepiphallic parameres (PsP) are long and slender, asymmetrical in shape and length and have sharp inward curved apices. The sclerites of the epi-ectophallic invagination do not have an apodem of the transverse parameral muscle. There is a wide and long ectophallic apodeme (EctAp) at the base (Arc) of the sclerites of the epi-ectophallic invagination.

Gorochov (1993) identified material from Saudi Arabia and Socotra in the NHMUK as this species. The material we collected in 2009 and 2010 tends to be smaller with shorter tegmina than the type specimens, especially in females (Table 6). Wing venation and the phallic complex are identical to Otte and Cade (1984) (Fig. 149).

Taxonomic notes. Otte and Cade (1984) described *Modicogryllus perplexus* from Transvaal, South Africa, giving a somewhat limited description in that it can only be identified by its genitalia.

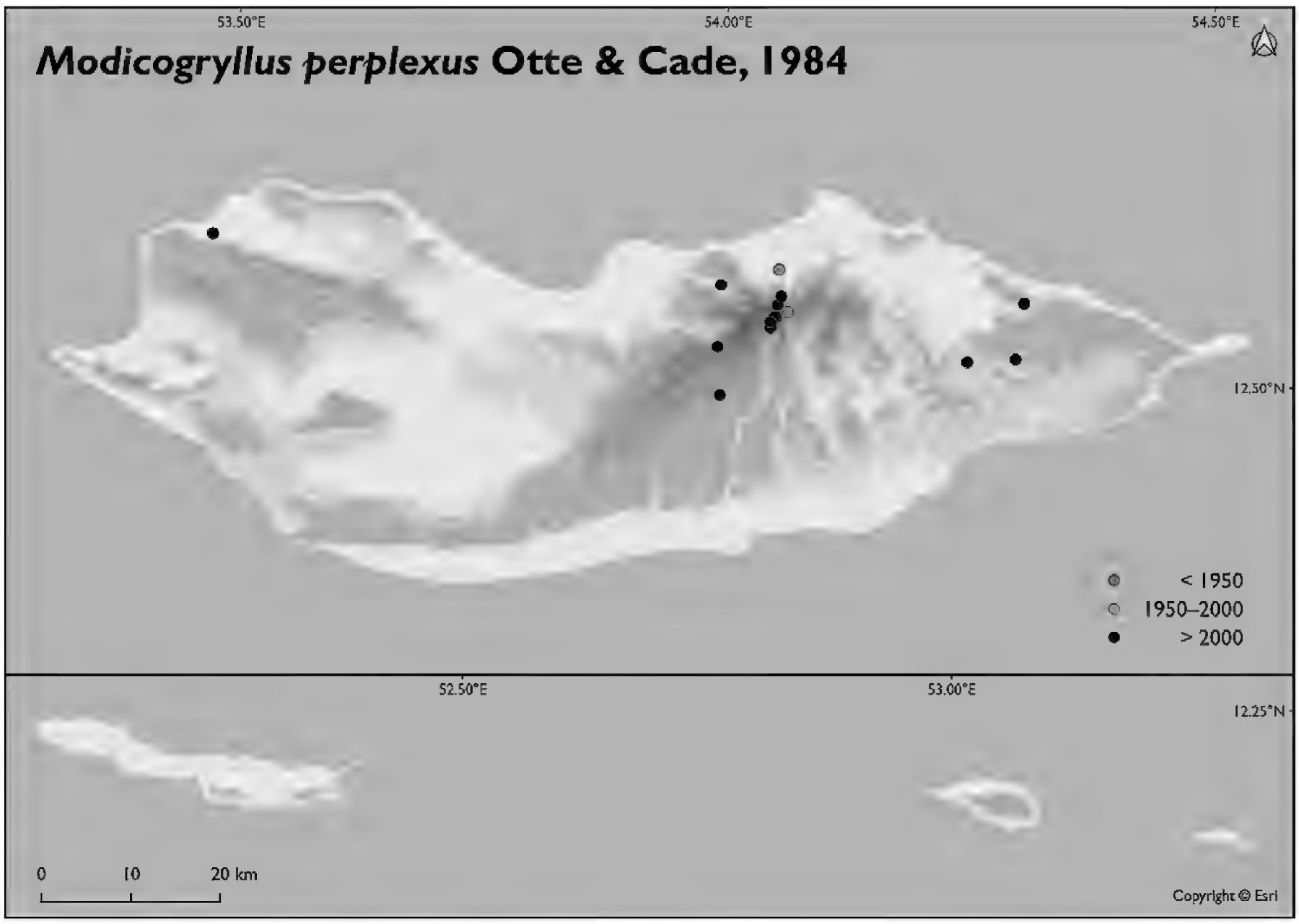

Figure 150. Distribution of *Modicogryllus perplexus* Otte & Cade, 1984 in the Socotra Archipelago.

Distribution and occurrence. This species is only known from Natal and Transvaal in eastern South Africa (Otte and Cade 1984; Otte et al. 1988), Saudi Arabia and Socotra (Gorochov 1993). On Socotra, it is widespread (Fig. 150). In Oct 2010, it was abundant at Wadi Zerig, Adho Dimello and Wadi Shilhin.

Habitat and biology. In South Africa, it is found in open grassy vegetation and around seasonally wet pans (Otte and Cade 1984). On Socotra, the habitat seems comparable: short and wet grassy vegetation, often near water, at elevations from 50–1100 m a.s.l. Records are from January, February, April, October and November.

Bioacoustics. The calling song of *M. perplexus* on Socotra consists of echemes lasting 400–450 ms and repeated at the rate of about 0.4–0.6 per second (Fig. 151A). Echemes consist of 22–25 syllables, repeated at 63–67 per second in the second two-thirds part, being slower and quieter in the first part (42–48 per second) (Fig. 151B). The carrier frequency is 5.6 kHz (5.5 kHz in the first few syllables) and has several harmonics at higher frequencies (Fig. 151C; XC877950, accessible at https://www.xeno-canto.org/877950).

Otte and Cade (1984) described the sound of specimens from South Africa as short trills consisting of two parts; the first third to two-thirds consists of a simple train of pulses; the second part consists of pairs of pulses. Deducing from the information in their publication, we would describe the calling song as consisting of echemes lasting 450–650 ms and repeated at about 0.8–1.4 per second. Echemes consist of about 32–36 syllables, repeated at 58–76 per second in the first part of the echeme up to 81–107 per second in the second part of the echeme and with 4–9 pairs of syllables (with a syllable repetition rate of 61–81 per second). The carrier frequency is 5.7–7.1 kHz.

The song of Socotran specimens is similar to that of South African specimens. However, there are also apparent differences, for example, in the number of syllables in echemes and the presence of pairs of syllables. Further research is needed to explain these differences.

Mogoplistidae
Mogoplistinae
Arachnocephalini

Ectatoderus guichardi Gorochov, 1993

Figs 152–156

References for Socotra. Gorochov 1993: 92–93; Wranik 2003: 316, plates 146, 149 [*partim*].

Diagnostic notes. Characteristic of the genus *Ectatoderus* is the prolonged, caudally wide and broadly rounded pronotum that completely covers the tegmina. The scape is relatively wide and the ratio of inter-antennal space (along the epistomal suture)/scape width is relatively small.

Diagnostic for *E. guichardi* is a protruding and bulbous clypeus, a short and relatively flat vertex and a somewhat triangular-shaped head, viewed from above (Figs 152–154). The ratio of inter-antennal space/scape width in *Ectatoderus guichardi* is around 1.66 in males and females (Table 7). The head and pronotum are light to dark

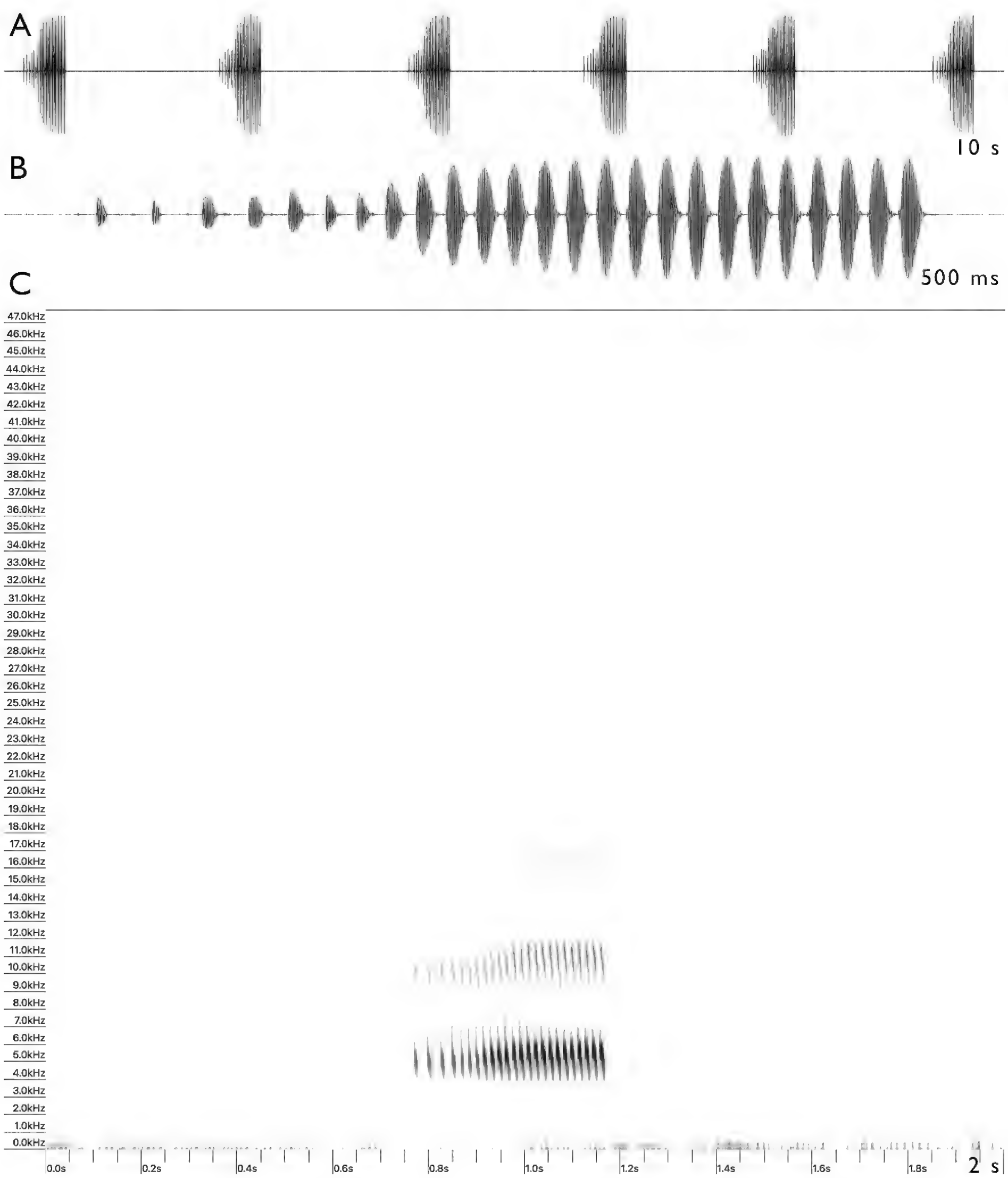

Figure 151. Calling song of *Modicogryllus perplexus* Otte & Cade, 1984. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Recorded at Adho Dimello, Socotra, 30 Oct 2010, 21:21 h; RecRF10147; SpRF10YE062; XC877950, accessible at https://www.xeno-canto.org/877950.

reddish-brown and the abdomen is dark brown. Legs and cerci are yellowish; the hind legs are darker near the joints (Figs 152, 153). Cerci in females almost reach the apex of the ovipositor. The male specimen collected in 2009 at Begobig is much smaller than the holotype; the female is comparable in size to the female paratypes (Table 7).

Besides *E. guichardi*, two unidentified species of *Ectatoderus* Guérin-Méneville, 1847 occur on Socotra. Possibly, they belong to yet undescribed species. We refer to these here as *Ectatoderus* sp. 2 and *Ectatoderus* sp. 3. They are treated concisely here and in the two following species accounts.

Table 7. Morphometrics of *Ectatoderus guichardi* Gorochov, 1993. Data are based on values given in Gorochov (1993), photographic material of the type specimens and measurements of specimens collected on Socotra in 2009.

Gender	Specimens	Body Length (mm)	Pronotum Length (mm)	Ratio inter-antennal distance/ scape width
Male	Types, including HT (n = 3)	8.0–9.5	4.5–5.0	1.65 (1.60–1.69)
	SpRF09YE292	6.6	3.5	1.67
Female	Paratypes	8.5–11.0	2.2–4.2	Not measured
	SpRF09YE289	8.8	2.0	1.67

Proper identifications and species descriptions need additional collections and material from which the song can be linked to the specimen. Specimens collected in 2010 are at MNHN, Paris and could not be analysed.

Figure 152. *Ectatoderus guichardi* Gorochov, 1993, male. Wadi Darho, Socotra, 1 Feb 2024 (photograph James Bailey).

Ectatoderus sp. 2 has a less protruding, not bulbous clypeus, a longer vertex and a more rounded head with less protruding eyes (Figs 154C, 158). The inter-antennal space/scape width ratio in *Ectatoderus* sp. 2 is 1.9. The brownish colours in *Ectatoderus* sp 2. lack reddish tones (Figs 154, 158). Songs of *E. guichardi* and *E.* sp 2. also differ significantly (see Bioacoustics).

Ectatoderus sp. 3 (Fig. 159) has an even higher inter-antennal space/scape width ratio of 3.1 (based on photographs) because of a very wide vertex (wider than in *Ectatoderus* sp. 2 and much wider than in *E. guichardi*). The body and legs are dark greyish with light markings. The pronotum is very broad with convex sides (Fig. 159).

Taxonomic notes. Gorochov (1993) described *Ectatoderus guichardi*, based on material collected by Guichard in 1967 (Fig. 153). Guichard (1967) did not mention collecting this tiny cricket species in his diary.

Distribution and occurrence. *E. guichardi* is endemic to Socotra. It is known from the Hagher, Diksam, Momi and Hamadera and is locally common, for example, at Adho Dimello, where large numbers were heard singing at night in 2010 (Fig. 155).

For remarks on Guichard's collecting site on Mt. Shihali on 20 April 1967, see the species account of *Dioscoridus depressus*.

Habitat and biology. In 2010, we found males singing at night in various shrubs. A specimen collected in 2012 at Momi was sifted out of sediment, indicating a hidden life during the day. Records of *E. guichardi* are from 350–1100 m a.s.l.

Bioacoustics. *E. guichardi* calls after sunset. Its song consists of a series of 2–3 echemes with a fairly constant pattern. The first echeme consists of 10–17

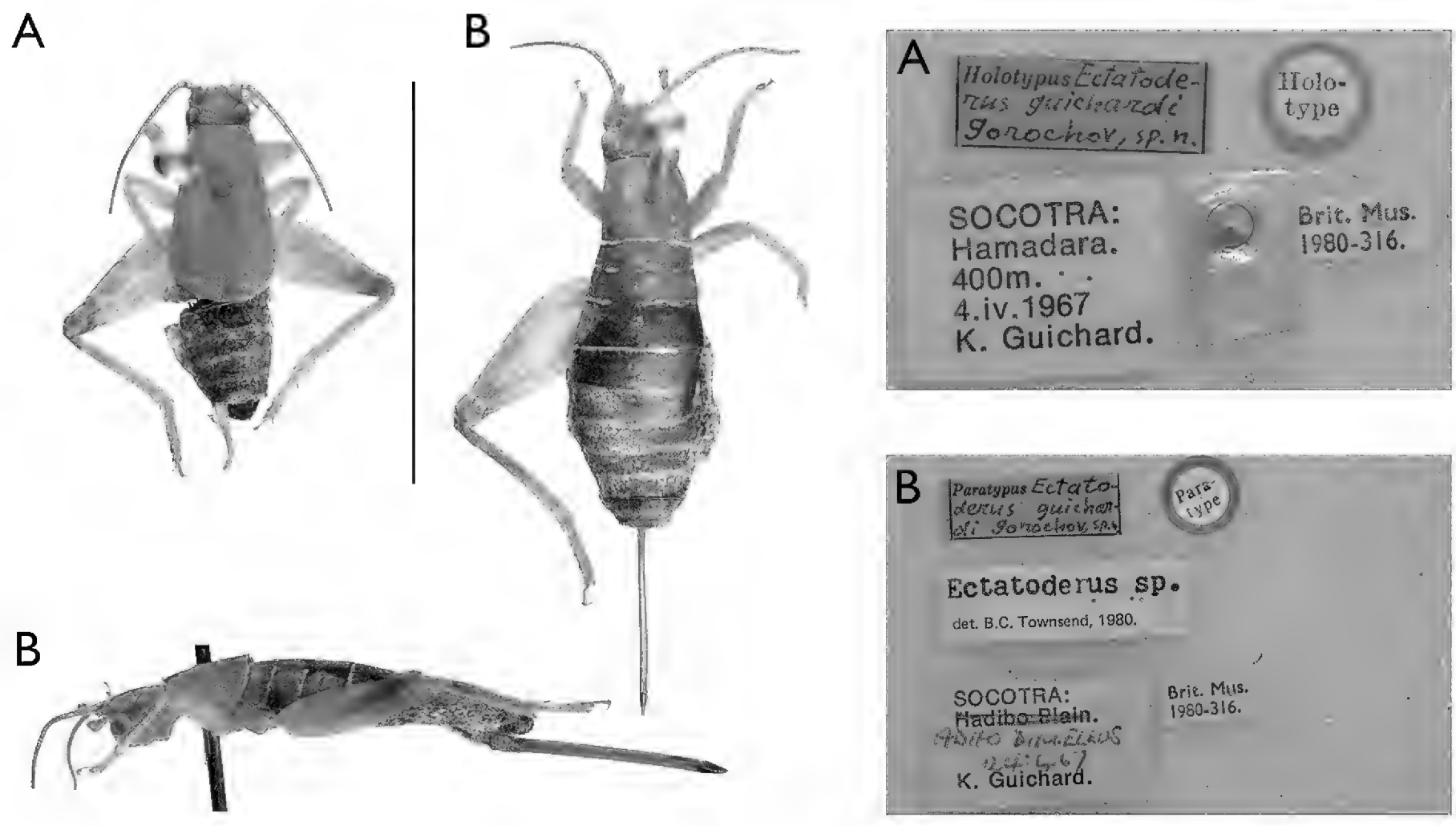

Figure 153. *Ectatoderus guichardi* Gorochov, 1993, male, female, type specimens. **A.** Male, holotype; **B.** Female, paratype. Collected by Guichard in 1967. Scale bar: 1 cm (photograph Rob Felix).

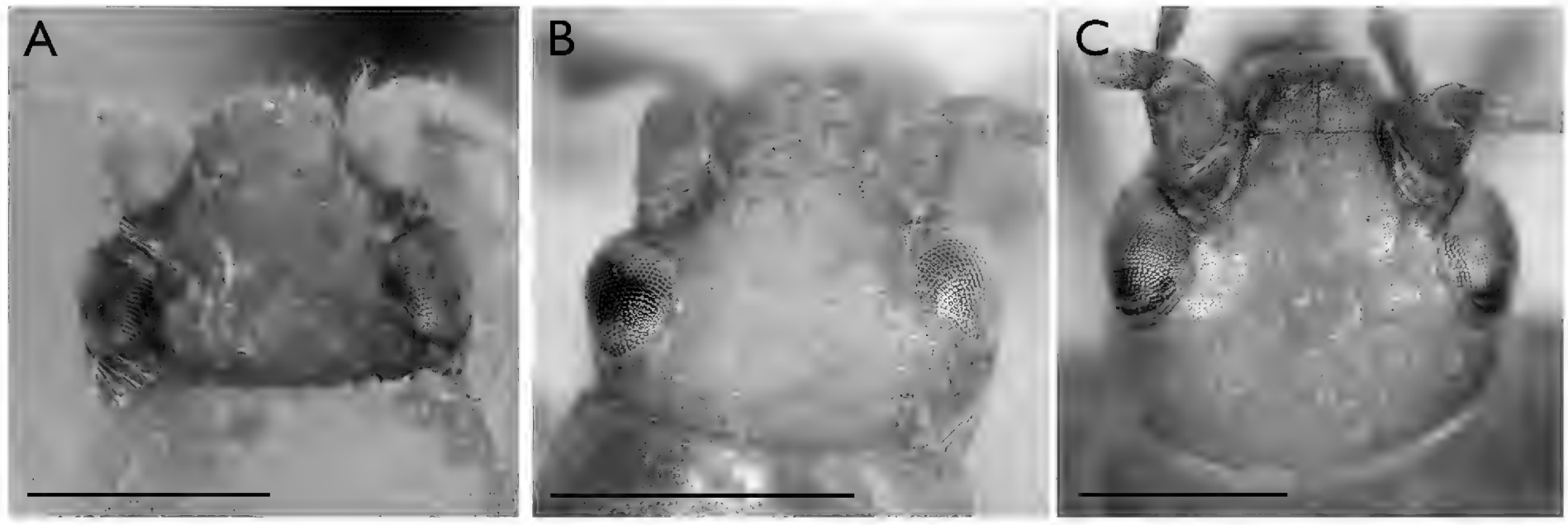

Figure 154. *Ectatoderus* spp., dorsal views of male's heads. **A.** *Ectatoderus guichardi* Gorochov, 1993, holotype, NHMUK015984152; **B.** *E. guichardi*, Begobig 2009, SpRF09YE292; **C.** *E.* sp. 2., Adho Dimello, SpRF10YE073. Scale bars: 1 mm (photographs Beulah Garner, NHMUK; Rob Felix).

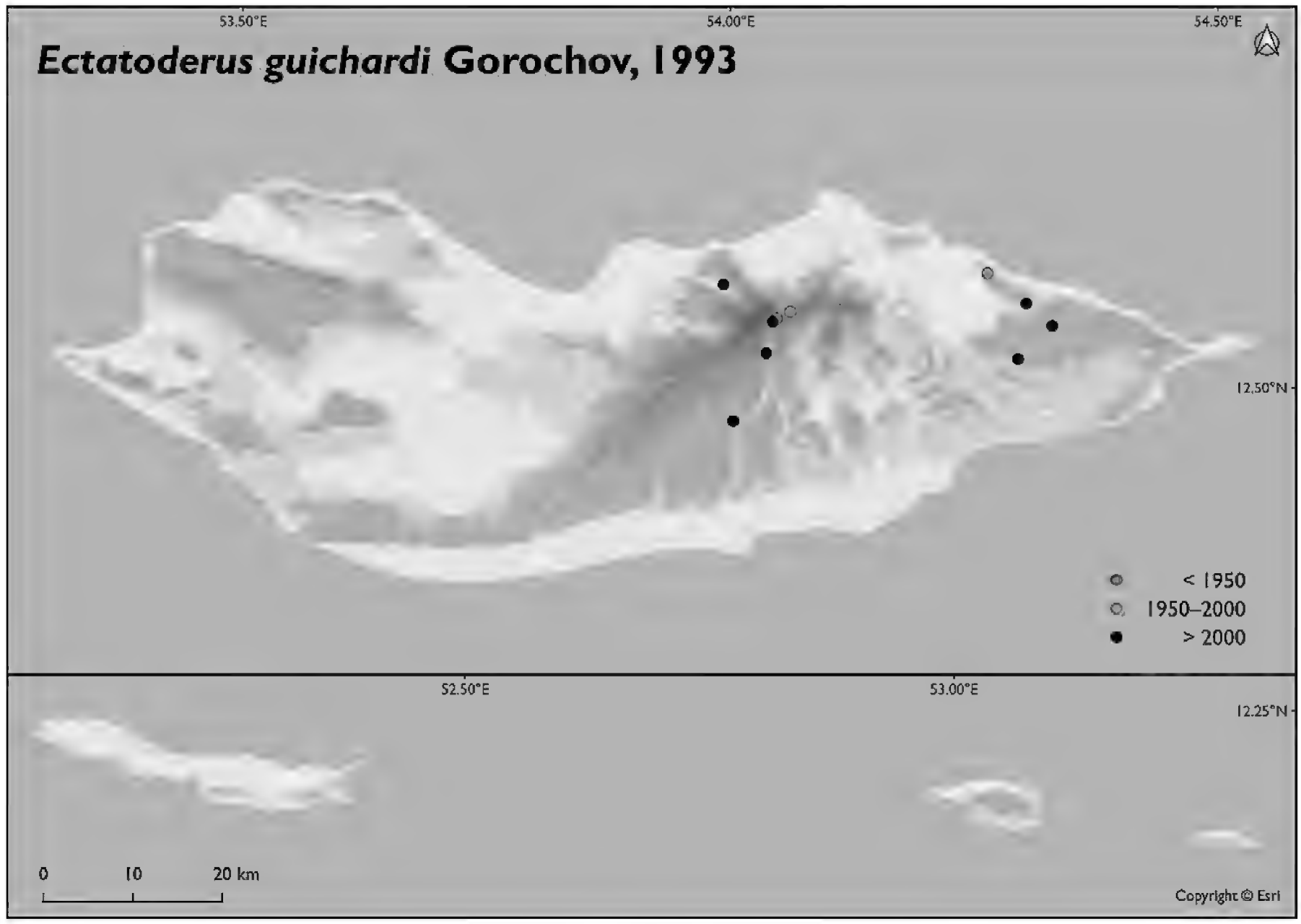

Figure 155. Distribution of *Ectatoderus guichardi* Gorochov, 1993 in the Socotra Archipelago.

syllables and lasts 600–1000 ms. This echeme may be missing in a series, contrary to the second and third echeme. The second echeme is short and consists of only two syllables; the third echeme has four syllables. Syllable duration is 30–35 ms; syllable repetition rate is 15–18/s. The carrier frequency of the song is between 4.5 and 5.6 kHz and has some harmonics at higher frequencies (Fig. 156; XC897108, accessible at https://xeno-canto.org/897108). Higher carrier frequencies and higher syllable repetition rates occur at higher temperatures in the lowland (e.g. RecRF10097) compared to lower temperatures in the mountains (e.g. RecRF10151 and 153).

Ectatoderus sp. 2

Figs 157, 158

Diagnostic notes. A yet unidentified species of *Ectatoderus* emits a calling song, as depicted in Fig. 157. That specimen has been collected, but was unavailable for analysis at the time of preparation of this paper. At

the same collecting event on the same site, a second specimen was collected, depicted in Fig. 154C. We assume both belong to the same species. A probable third specimen of this species is depicted in Fig. 158.

For characteristics, see *Ectatoderus guichardi* and Figs 154C, 158.

Distribution and occurrence. *E.* sp. 2 is known from Adho Dimello in the Hagher, where fair numbers were heard singing at night in 2010. Its song has also been recorded at Neet in 2010.

Bioacoustics. *Ectatoderus* sp. 2 emits its calling song at night. It consists of two syllables with an interval of about 100–140 ms. This set of two syllables is repeated in a short series every 1–1.5 s. The syllable duration is about 30–60 ms. The carrier frequency of the song is between 3.9 and 4.2 kHz, with some harmonics at higher

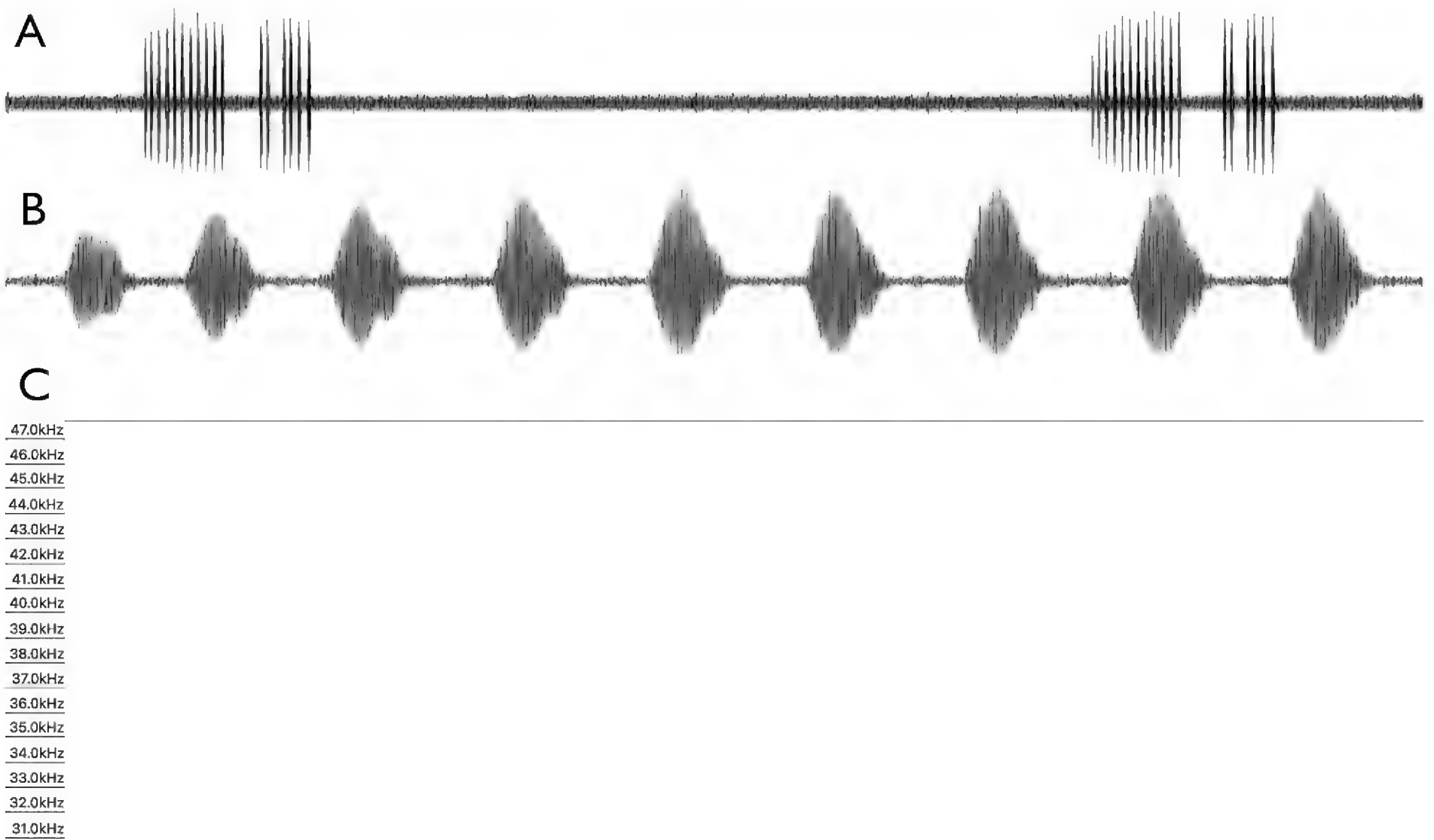

Figure 156. Calling song of *Ectatoderus guichardi* Gorochov, 1993. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Ayhaft, Socotra, 26 Oct 2010, 20:23 h; RecRF10097; SpRF10YE015; XC897108, accessible at https://xeno-canto.org/897108.

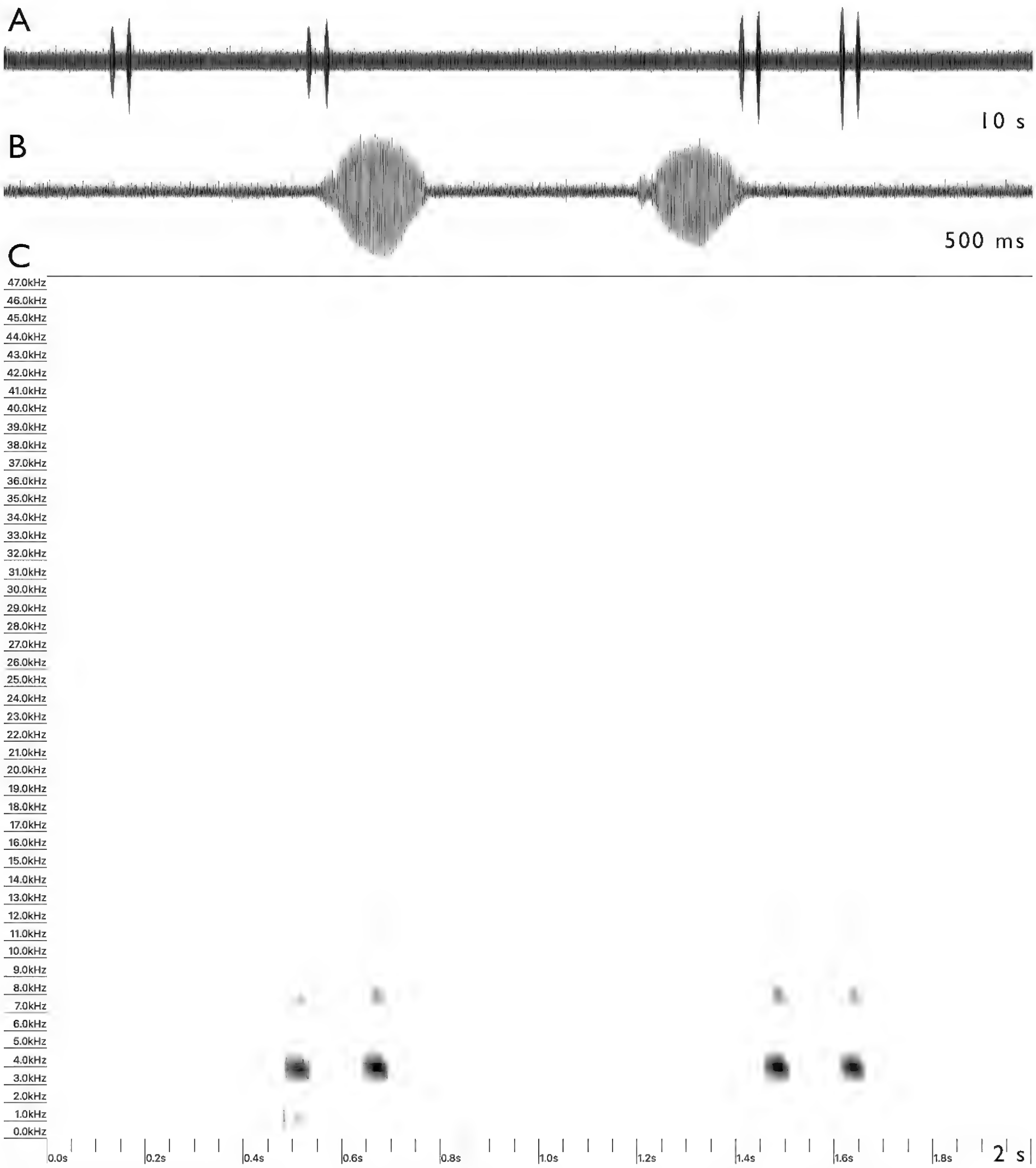

Figure 157. Calling song of *Ectatoderus* sp. 2. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Adho Dimello, Socotra, 30 Oct 2010, 20:23 h; RecRF10158; SpRF10YE060; XC877954, accessible at https://www.xeno-canto.org/877954.

frequencies (Fig. 157; XC877954, accessible at https://www.xeno-canto.org/877954).

Ectatoderus sp. 3

Figs 159, 161

Diagnostic notes. A third species of *Ectatoderus* is only photographed and sound recorded. See *Ectatoderus guichardi* and Figs 159, 160 for diagnostic characteristics.

Distribution and occurrence. *Ectatoderus* sp. 3 is known from two photographic records by James Bailey in 2024, one at Firmihin and one on Noged Plain (Figs 159, 160), both in two very different habitats. These records suggest a rather wide distribution on the island (see https://www.inaturalist.org/observations/203184039 and https://www.inaturalist.org/observations/199187230. *E.* sp. 3 probably also occurs at Neet.

Bioacoustics. The calling song of *Ectatoderus* sp. 3, emitted at night, resembles the song of *E.* sp. 2. in structure

Figure 158. *Ectatoderus* sp. 2, male singing. Adho Dimello, 30 Oct 2010. In *Searsia thyrsiflora* (photograph Rob Felix).

(Fig. 157), but is higher (Fig. 161). The carrier frequency of this taxon seems to vary between 5.0–5.9 kHz. The specimen depicted in Fig. 161 has a carrier frequency of around 5.0 kHz. In the recording made at Neet, where the same type of song was recorded in 2010 (RecRF10119, 125–127), the frequency is around 5.9 kHz.

Recordings at Neet also show a taxon with a frequency of 3.9 kHz, possibly belonging to *Ectatoderus* sp. 2 (RecRF10129–141). Further analysis of the bioacoustics of both species can only be satisfactorily conducted if the specimens from which the recordings were made are available for study.

Mogoplistini

***Mogoplistes* aff. *M. brunneus* Serville, 1838**

Fig. 160

Diagnostic notes. *Mogoplistes* is distinguished from *Ectatoderus* by the following characteristics: males are apterous with a more or less square pronotum (not elongated), the clypeus lacks a median furrow, the scape is very narrow and the broad inter-antennal space broad (hence with a very high inter-antennal space/scape width ratio).

On Socotra, a yet unidentified member of the Mogoplistini tribe occurs (Fig. 161), probably belonging to *Mogoplistes* and related to *M. brunneus* Serville, 1838. Since *M. brunneus* is a species confined to the Mediterranean, the taxon on Socotra probably belongs to another

Figure 159. *Ectatoderus* sp. 3, male. Firmihin, Socotra, 3 Feb 2024 (photograph James Bailey).

species. For now, only nymphs have been recorded. In 2009 and 2010, several specimens were collected; in 2024, a late instar nymph was photographed (Fig. 161). For proper identification and description, more material must be collected.

Distribution and occurrence. *Mogoplistes* aff. *M. brunneus* is known from several records on the island, suggesting a rather wide distribution. See https://www.inaturalist.org/observations/203184073.

Oecanthidae
Oecanthinae
Oecanthini

***Oecanthus castaneus* Felix & Bouwman, sp. nov.**

https://zoobank.org/2F8A86E1-BF77-477C-9491-D091EA1A81F0

Figs 162–172

References for Socotra. Krauss 1907: 17, 27, 30 [*partim*; as *Oecanthus indicus*]; Uvarov (in Uvarov and Popov (1957)): 364–365 [*partim*; as *Oecanthus chopardi*]; Gorochov 1993: 92 [*partim*; as *O. chopardi*]; Wranik 2003: 316, plates 146, 149 [*partim*; as *O. chopardi*]; Chintauan-Marquier et al. 2016: 60, 70 [as *O. chopardi*]; De Campos et al. 2022: 6 [as *O. chopardi*].

Figure 160. *Mogoplistes* aff. *M. brunneus* Serville, 1838, female, nymph. Firmihin, Socotra, 3 Feb 2024 (photograph James Bailey).

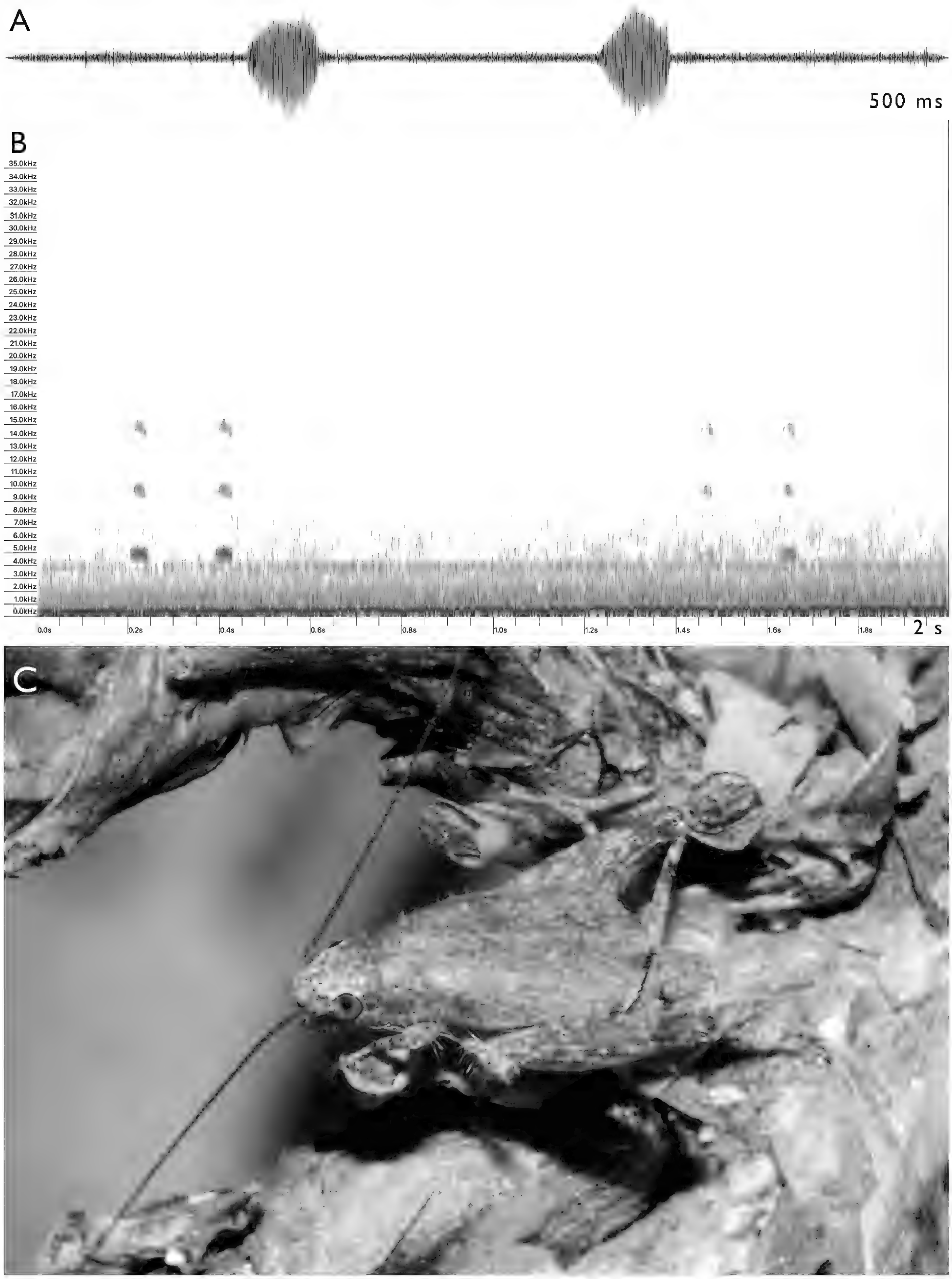

Figure 161. Ectatoderus sp. 3 and its calling song. Oscillogram (**A**) and spectrogram (**B**) depicting 500 ms (**A**) and 2 s (**B**). **C.** Recorded male specimen. Noged Plain, Socotra, 3 Feb 2024, 20:53 h (https://www.inaturalist.org/observations/199187230). (photograph James Bailey).

Material examined. ***Holotype*.** YEMEN ● 1♂, on alcohol; Socotra, Aloove area, Aloove vill. env. *Jatropha unicostata* shrubland with *Boswellia elongata* trees; 221 m a.s.l.; 12°31.2'N, 54°07.4'E [12.5200°N, 54.1233°E]; 19–20 Jun 2012; J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg.; NMPC SpCZ12YE024A.

***Paratypes*.** YEMEN ● 1♂; Sokótra; Jan 1899; O. Simony leg.; NMW ● 1♀; Sokótra; Feb 1899; O. Simony leg.; NMW ● 1♂ [former paratype of *Oecanthus chopardi* Uvarov, 1957]; Socotra, Moabbadh plain [Maabad], east of Hadiboh; [12.6377°N, 54.1499°E]; 10–12 Feb 1953; G. Popov leg.; NHMUK016032520 ● 1♂; Socotra, Qualansiyah [Qalansiyah]; [12.6888°N, 53.4877°E]; 25 Mar 1967; K. Guichard leg.; NHMUK016032747 ● 1♀; same as for previous; NHMUK016032489 ● 2♂; Socotra, Hadiboh Plain; 50 m a.s.l.; [12.6216°N, 54.0522°E]; 12 Apr 1967; K. Guichard leg.; NHMUK016032577, NHMUK016032824 ● 1♀; same as for previous NHMUK016032601 ● 2♀; Socotra, Hadiboh Plain; 30 m a.s.l.; [12.6216°N, 54.0522°E]; 2 May 1967; K. Guichard leg.; NHMUK016032587, NHMUK016032767 ● 1♀; Socotra, Husaant [Haasan]; 12.5016°N, 54.1452°E]; 29 Nov 1999; W. Wranik leg.; NMPC ● 1♀; Socotra, Di Lisha [Di Hashus]; 12°31'48"N, 53°59'08"E [12.5300°N, 53.9855°E]; 4 Apr 2008; B. Massa leg.; BMPC ● 1♂; Socotra, Qalansiyah river (Shata) [Bi'r Haarso]; [12.6273°N, 53.6076°E]; 6 Apr 2008; B. Massa leg.; BMPC ● 2♂, 3♀; Socotra, Wadi Ayehv [Wadi Ayhaft]; 12°37'17"N, 53°56'16"E [12.6213°N, 53.9377°E]; 10 Apr 2008; B. Massa leg.; BMPC ● 1♂; Socotra, Wadi Ayhaft; 266 m a.s.l.; 12.6059°N, 53.9927°E; 22 Feb 2009; R. Felix, J. Bouwman & R. Ketelaar leg.; RFPC SpRF09YE327 ● 1♀; same data as for previous RFPC SpRF09YE322 ● 1♂; Socotra, Ridah [Begobig], Momi Plateau; 350 m a.s.l.; [12.5294°N, 54.2949°E]; 24 Feb 2009; R. Felix, J. Bouwman & R. Ketelaar leg.; RFPC SpRF09YE324 ● 1♂; Socotra, Halmi beach; 12°21.324'N, 54°04.780'E [12.3554°N, 54.0796°E]; 16 Jun 2009; V. Hula leg.; NMPC ● 1♂; Socotra, Wadi Ayhaft; 266 m a.s.l.; 12.6059°N,

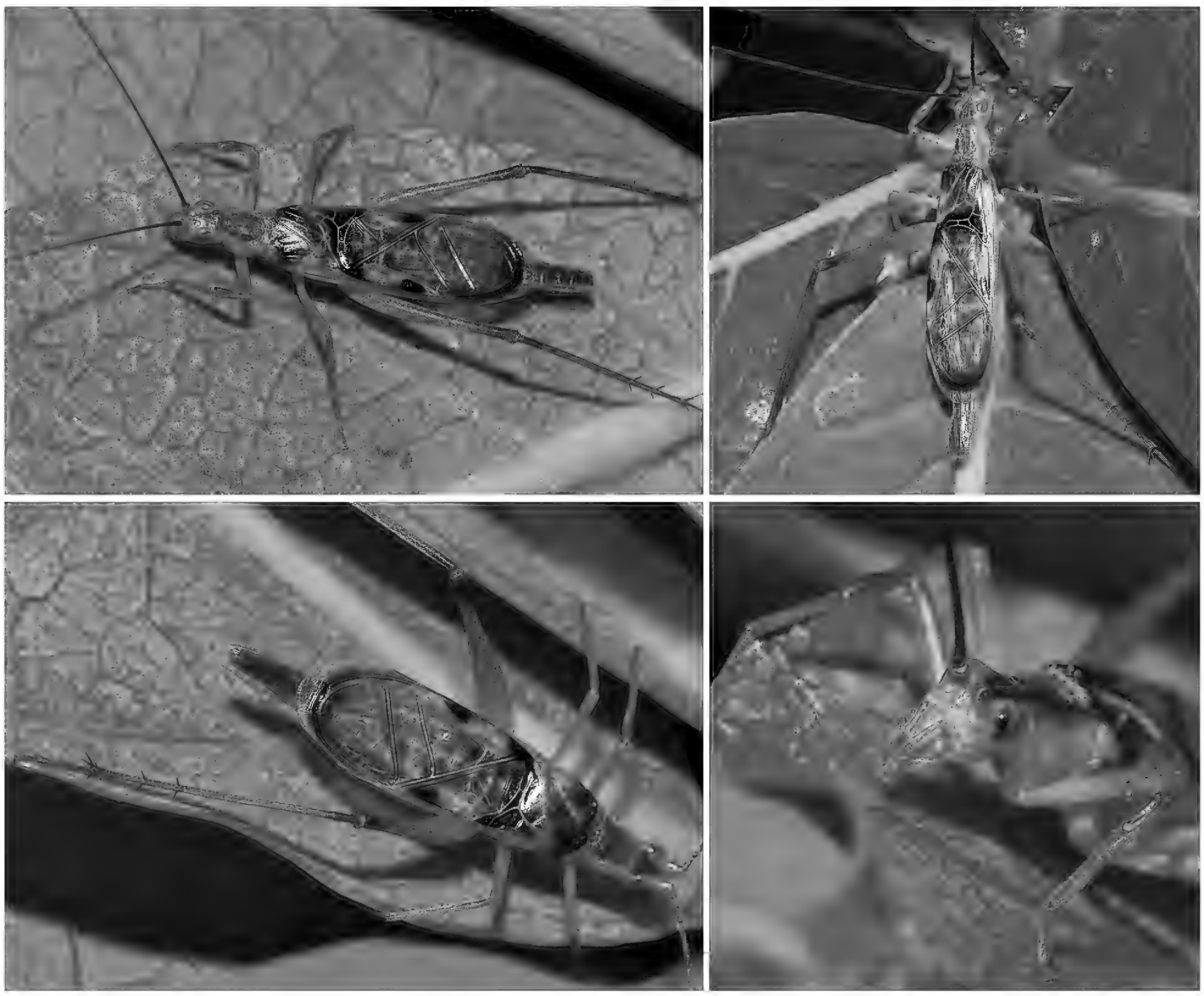

Figure 162. *Oecanthus castaneus* Felix & Bouwman, sp. nov., male. Hagher mountains, Socotra, 9 Mar 2024 (photograph James Bailey).

53.9927°E; 26 Oct 2010; R. Felix, J. Bouwman & R. Ketelaar leg.; RFPC SpRF10YE018 ● 1♂; Socotra, Hadiboh; 23 m a.s.l.; 12.6453°N, 54.0128°E; 3 Nov 2010; R. Felix, J. Bouwman & R. Ketelaar leg.; Sound recording RecRF10202–206; RFPC SpRF10YE119 ● 1♀; Socotra, Wadi Ayhaft; 200 m a.s.l.; 12°36.5'N, 53°58.9'E; [12.6083°N, 53.9816°E]; 7–8 Nov 2010; J. Hájek leg.; NMPC ● 1; Socotra, Shahab area, Baa vill. env. [Ba'a]; [12.5413°N, 54.1730°E]; 9 Nov. 2010; J. Hájek leg.; NMPC ● 1♀; Socotra, Noged Plain, Sharet Halma vill., env.; 20 m a.s.l.; 12°21.9'N, 54°05.3'E; [12.3650°N, 54.0883°E]; 10–11 Nov 2010; J. Bezděk leg.; NMPC ● 1♂; Socotra, Delisha vill. env. *Jatropha unicostata* shrubland, at light; 36 m a.s.l.; 12°41.2'N, 54°07.7'E; [12.6866°N, 54.1283°E]; 8 Jun 2012; J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg.; NMPC SpCZ12YE032 ● 1♀; same as for previous NMPC SpCZ12YE031 ● 1♀; Socotra, Noged Plain, Abataro, border of dunes and succulent bush; 20 m a.s.l.; 12°22.1'N, 54°03.4'E [12.3683°N, 54.0566°E]; 12–13 Jun 2012; J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg.; NMPC SpCZ12YE039 ● 2♂; Socotra, Aloove area, Aloove vill. env. *Jatropha unicostata* shrubland with *Boswellia elongata* trees; 221 m a.s.l.; 12°31.2'N, 54°07.4'E [12.5200°N, 54.1233°E]; 19–20 Jun 2012; J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg.; NMPC SpCZ12YE024B, C ● 1♀; same as for previous; NMPC SpCZ12YE022 ● 1♂; Socotra, Wadi Matyaf (lower part), Noged; [20–30 m a.s.l.]; [12.4505°N, 54.3013°E]; 21 Jan 2014; A. Carapezza leg.; BMPC.

Additional material. YEMEN ● 1♂; Socotra, Hadiboh; 16 m a.s.l.; 12.6488°N, 54.0129°E; 21 Feb 2009; R. Felix, J. Bouwman & R. Ketelaar leg.; RFPC SpRF09YE323 [damaged; only genitalia available] ● 1♂; Socotra, Shuab; 8 m a.s.l.; 12.5779°N, 53.4002°E; 1 Mar 2009; R. Felix, J. Bouwman & R. Ketelaar leg.; RFPC SpRF09YE326 [damaged].

Generic placement. *Oecanthus castaneus* Felix & Bouwman, sp. nov. (Figs 162, 163), as well as *O. chopardi* Uvarov, 1957 (Fig. 173), the other tree cricket existing in the Archipelago, belong to the above-mentioned suprageneric ranks, based on the following characteristics, amongst others: the lateral field of the tegmen forming a sharp angle with the dorsal field; ovipositor straight in lateral view; male tegmen with a large mirror with two dividing veins and an almost absent apical field; dorsal valves of the ovipositor bifurcated apically; pseudepiphallic sclerite wider than long, with two main lobes and long rami; arc projecting anteriorly, with two long distal prolongations; cerci longer than FII (De Campos et al. 2022).

The two Socotran species have many characteristics that are considered diagnostic to *Viphyus* (Otte, 1988): a weakly prognathous head (Fig. 164A); two thin dark lines

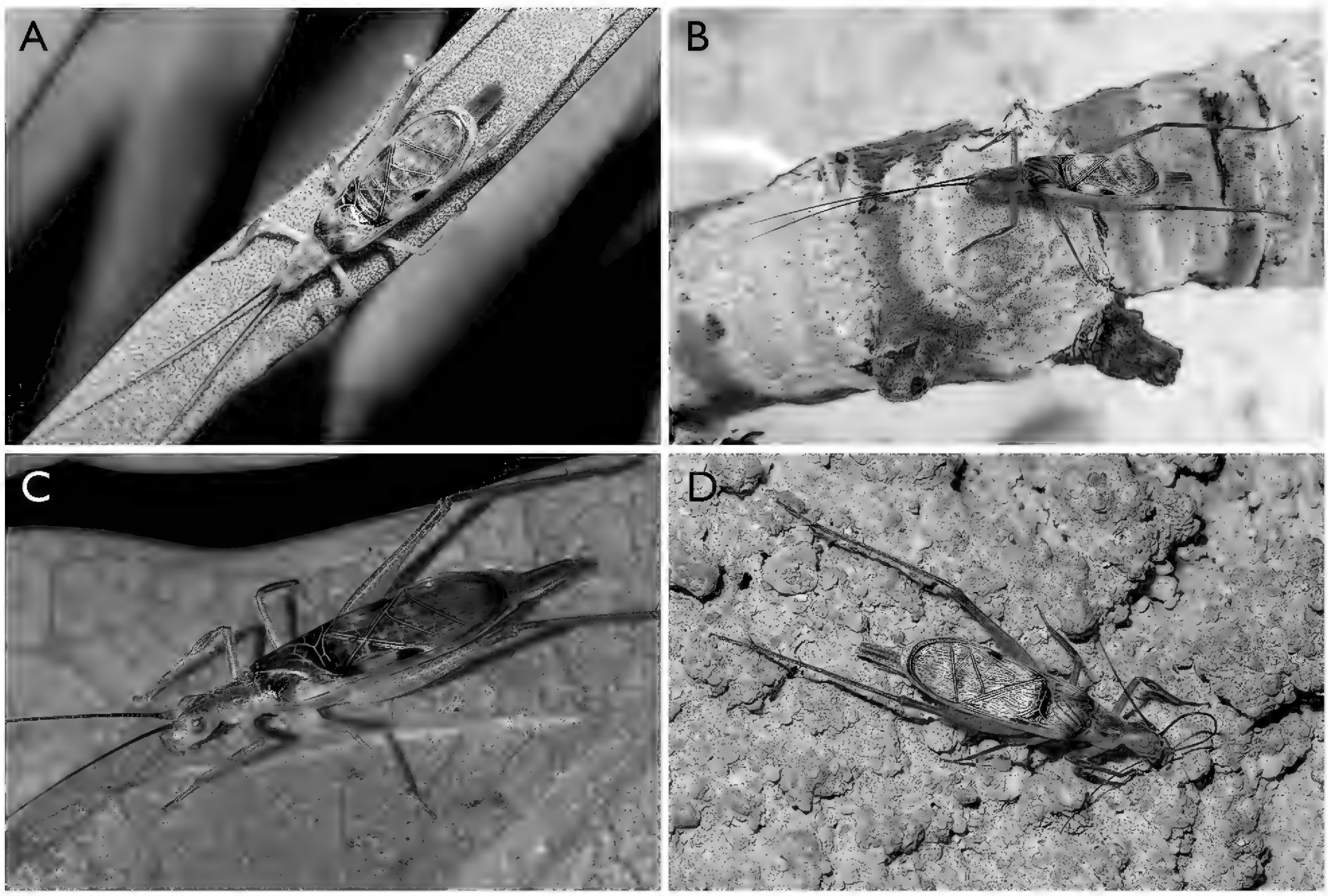

Figure 163. *Oecanthus castaneus* Felix & Bouwman, sp. nov., males. **A.** Ditwah, Socotra, 8 Feb 2024; **B.** Momi Plateau, Socotra, 2 Nov 2010; **C.** Hagher mountains, Socotra, 9 Mar 2024; **D.** Hadiboh, Socotra, 7 Nov 2010 (photographs **A, C.** James Bailey; **B.** Jaap Bouwman; **D.** Rob Felix).

bordering the light mid-line of the pronotum (Fig. 164B), ventral apical spurs on both TI and TII (Fig. 164E); black spots on the basal antennal segments (Fig. 164A); spots on the outer surface of the hind femur (Figs 164C, 165A); two outer and three inner, dorsal, subapical spurs on TIII (Fig. 164F); a well-developed metascutum and metascutellum, both more or less of the same length (Fig. 166); extensive dark markings on the tegmina (Toms and Otte 1988). See Cigliano et al. (2024b) for photographs of *Viphyus victorinoxi* Otte, 1988, the type species of the genus.

Viphyus, however, has a median scutal tubercle, missing in *O. castaneus* sp. nov. and *O. chopardi* (Fig. 166). Furthermore, in *Viphyus*, the main lobes of the pseudepiphallus in the phallic complex are steeply pointing upwards. In the Socotran species, the main lobes of the pseudepiphallus do not steeply slope upwards (Fig. 168E, F). At the same time, the pseudepiphallic parameres in the Socotran species differ from those in *Viphyus* and resemble those of *Oecanthus*. In (most) *Oecanthus*, however, there are no ventral apical spurs on TI or TII, only the metascutum is elaborately modified, a median scutal tubercle is presen, and TIII generally has 4–5 pairs of subapical spurs instead of 2–3 (Chopard 1955; Walker and Gurney 1967; Toms and Otte 1988; Collins in litt 2024).

Diagnostic notes. *Oecanthus castaneus* Felix & Bouwman, sp. nov. can be separated from *O. chopardi* by its distinctive warm appearance due to its orange-brown colours and extensive brown markings on the wings

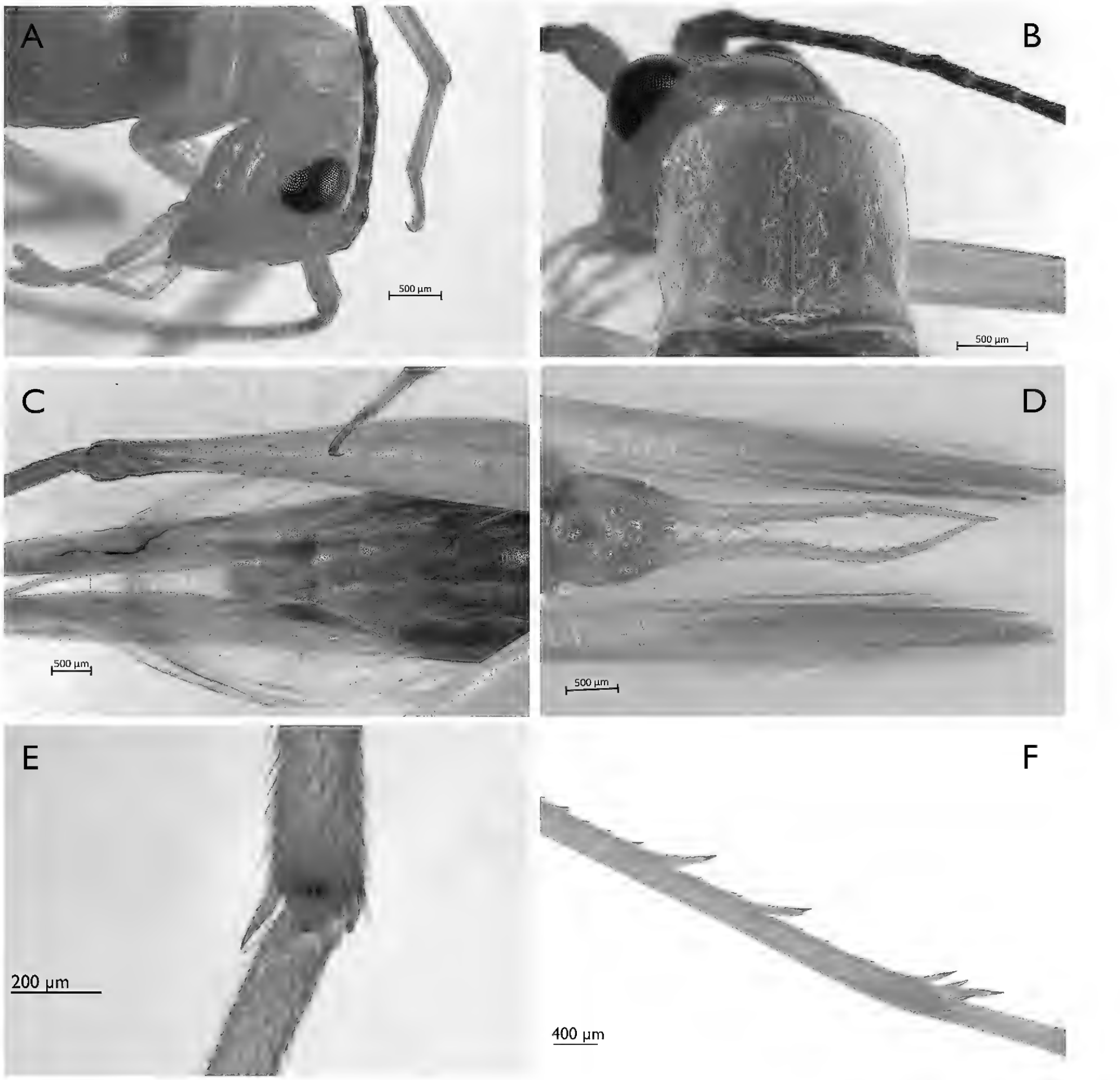

Figure 164. *Oecanthus castaneus* Felix & Bouwman, sp. nov., male, holotype. **A.** Head and first antenna segments; **B.** Pronotum, dorsal view; **C.** Subgenital plate; **D.** Cerci; **E.** TII, ventral, inner, apical spur; **F.** TIII, inner, subapical and apical spurs. SpCZ12YE024A (photographs Rob Felix and Jaap Bouwman).

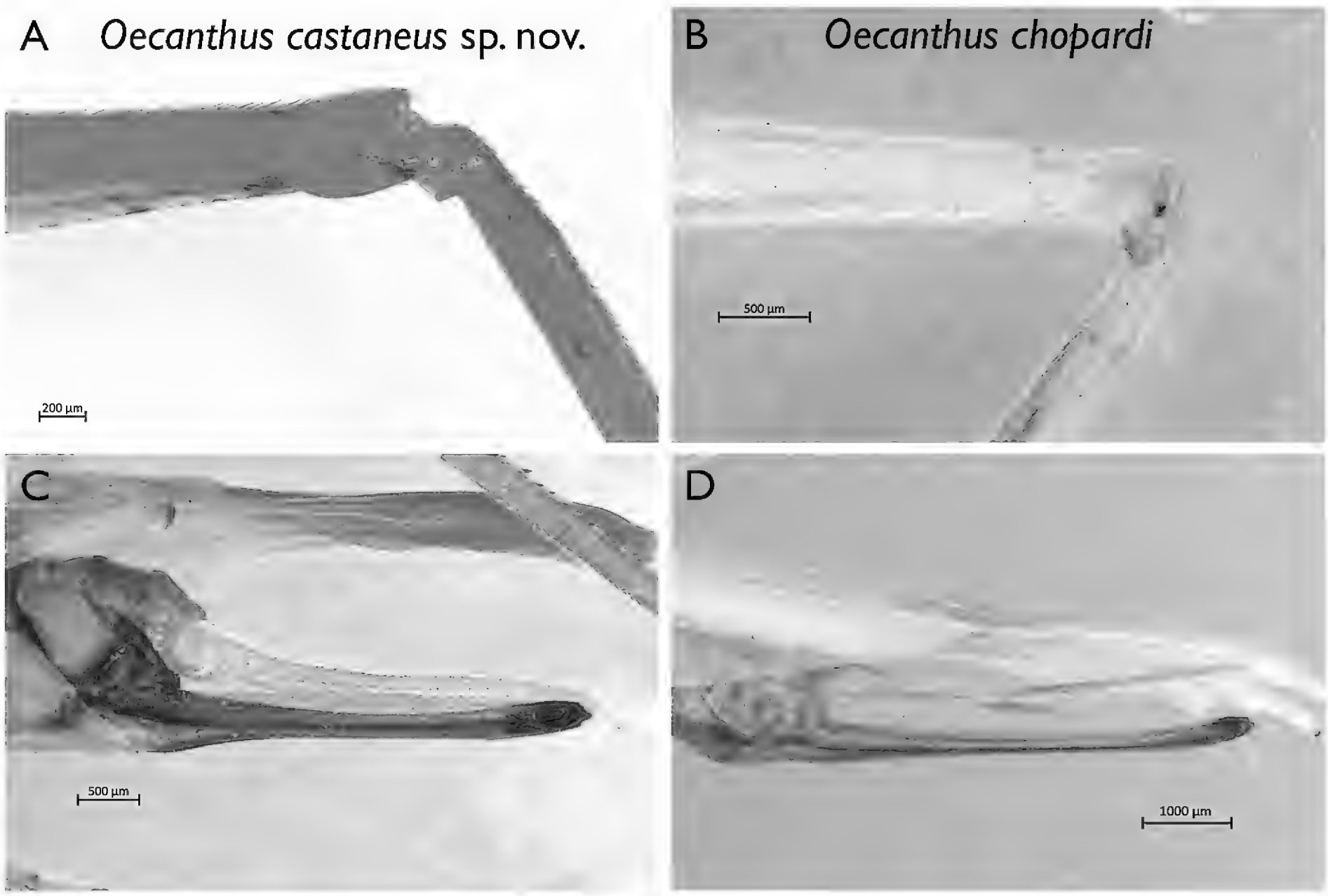

Figure 165. *Oecanthus castaneus* Felix & Bouwman, sp. nov., male, female, paratypes and *O. chopardi* Uvarov, 1957, female. **A, B.** Outer ventral lobe of the hind knee; SpCZ12YE024B, SpRF09YE329; **C, D.** Ovipositor; SpCZ12YE022, SpRF09YE330 (photographs Rob Felix and Jaap Bouwman).

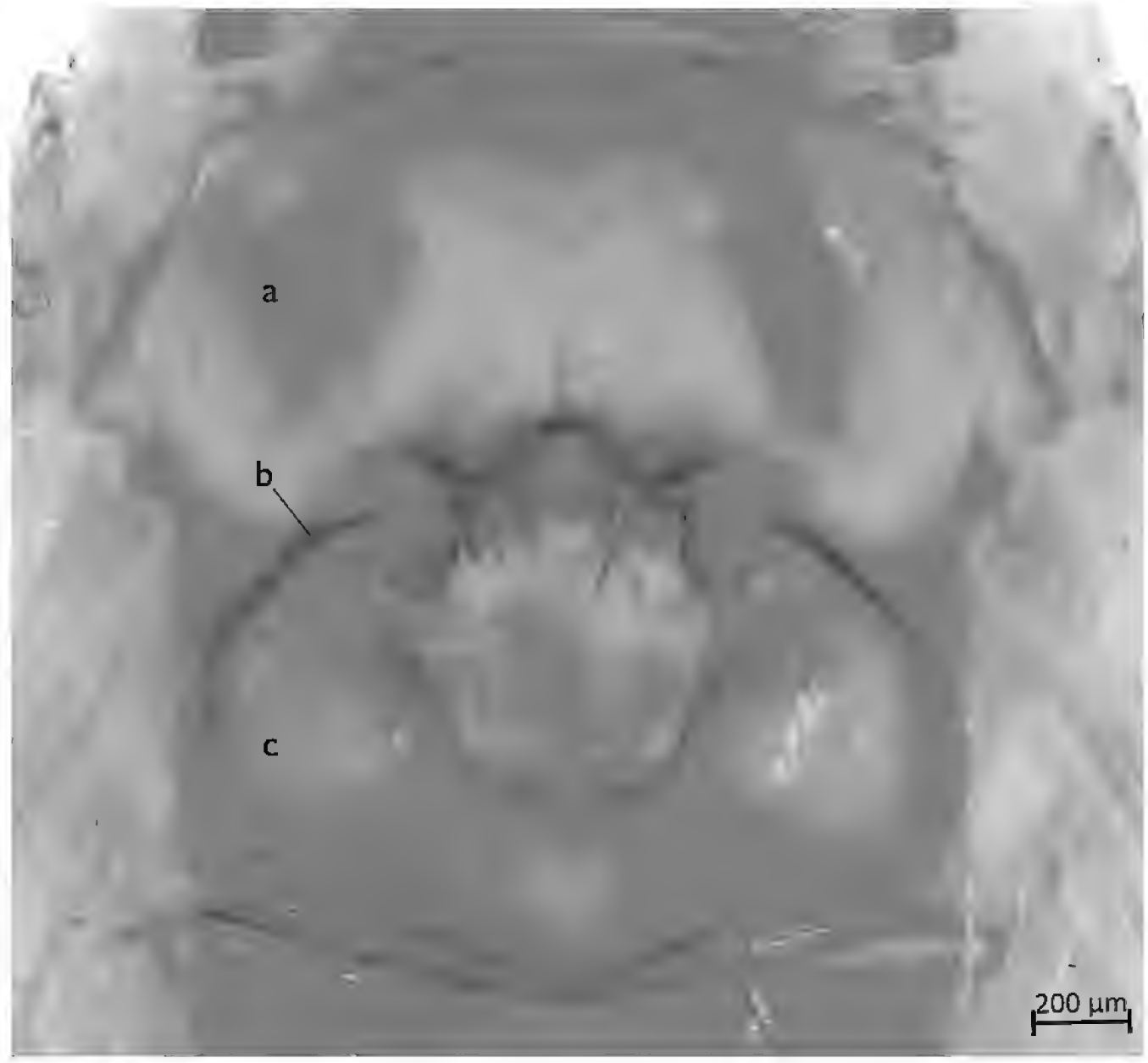

Figure 166. *Oecanthus castaneus* Felix & Bouwman, sp. nov., male, paratype, metanotal gland. **a.** Metascutum; **b.** Scuto-scutellar suture; **c.** Metascutellum. SpCZ12YE024B (photograph Rob Felix and Jaap Bouwman).

(Figs 162, 163). *Oecanthus chopardi* is never brownish, but always uniformly whitish to pale straw, often with bright greenish tones (Fig. 173). Where the sides of the head, pronotum and legs are orange-brown in *O. castaneus* sp. nov., they are whitish to pale straw in *O. chopardi*. Dorsally, the head and pronotum of *O. castaneus* sp. nov. are darker brown, whereas *O. chopardi* has greenish tones in those parts (Fig. 173). *O. castaneus* sp. nov. has almost entirely blackish-brown antennae, except for the lighter scape and pedicle, while in *O. chopardi*, the antennae are light and of the same colour as the body (Figs 173, 177). The tegmina of *O. castaneus* sp. nov. are extensively marked blackish-brown, but there is variation in the extent (Fig. 167A). The base of the tegmina is variably dark brown and the file and the plectrum are flanked with intensive blackish markings (Fig. 167A, C). There is a large brown spot in the chordal area, halfway to the inner edge of the tegmina. The veins in the distal part of the dorsal field are all bordered brown, the cells are marked with infumated spots and the wing's apex is heavily infumated (Fig. 167A). In *O. chopardi*, the tegmina are translucent white to greenish, with only two small dark markings, one

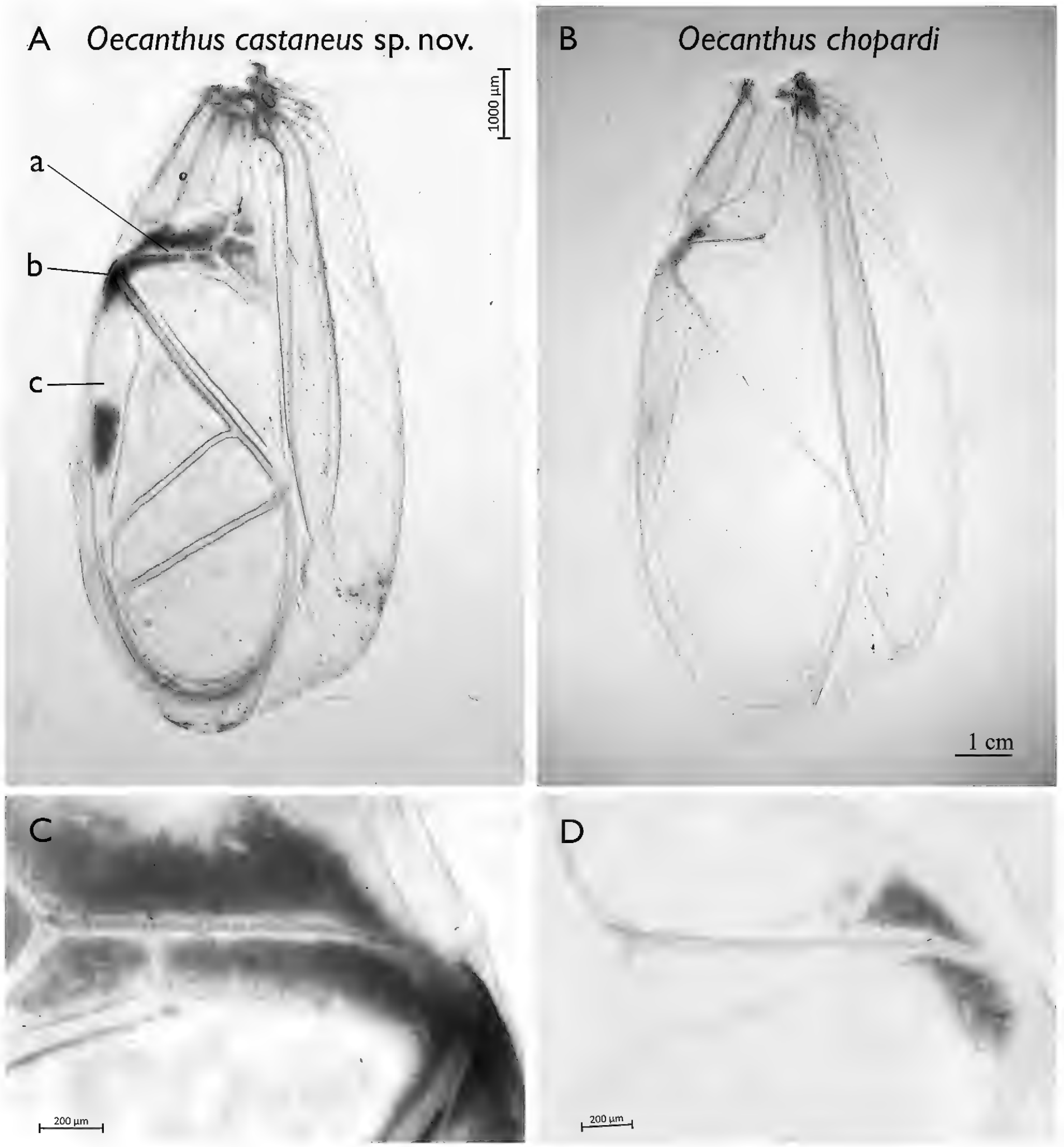

Figure 167. *Oecanthus castaneus* Felix & Bouwman, sp. nov., male, paratype and *O. chopardi* Uvarov, 1957, male. **A, B.** Right tegmen, dorsal view: **a.** Stridulatory file, **b.** Plectrum, **c.** Chordal field; **C, D.** Stridulatory file, right tegmen. SpCZ12YE024B (**A, C**); SpRF09YE335 (**B, D**) (photographs Rob Felix and Jaap Bouwman).

on the distal part of the file bordering the plectrum and a smaller one in the chordal area (Fig. 167B). The tegmina in male *O. castaneus* sp. nov. are slightly narrower and shorter than *O. chopardi* (Table 8; Fig. 167); in females, they are at least shorter (width not measured). The female cerci and ovipositor of *O. castaneus* sp. nov. are shorter (< 4.0 mm and < 4.5 mm, respectively) than in *O. chopardi* (> 4.5 mm and > 5.0 mm, respectively) (Table 8; Fig. 165). In *O. castaneus* sp. nov., both inner and outer ventral lobes of the hind knee are lined black dorsally (Fig. 165A), whereas, in *O. chopardi*, they are only tipped black (Fig. 165B). The female subgenital plate of *O. castaneus* sp. nov. is triangular with an obtuse apex; in *O. chopardi*, it is more trapezoid with a broadly rounded to truncated apex. The metanotum of both species does not differ markedly, which is a common phenomenon in closely-related species (Walker and Gurney 1967).

The stridulatory file in *O. castaneus* sp. nov. is straight with 45–54 teeth (Fig. 167C). The only studied specimen of *O. chopardi* has 59 teeth (Table 8) and a slightly more sinuous file (Fig. 167D).

The pseudepiphallic sclerite in *O. castaneus* sp. nov. forms a transverse, narrow bridge with a slightly curved anterior margin in the dorsal view (Fig. 168A). In *O. chopardi*, the transverse bridge is broader and the anterior margin is almost straight in dorsal view (Fig. 168B). The main lobes of the pseudepiphallus differ slightly between both species. In *O. castaneus* sp. nov., the two lobes point more directly caudal and are somewhat slender, while in *O. chopardi*, the lobes curve more inwards and are somewhat coarser with a broader base (Fig. 168).

O. castaneus sp. nov. is distinguished from the following three species of *Oecanthus* known from the Arabian Peninsula: *O. pellucens* (Scopoli, 1763), *O. dulcisonans* Gorochov, 1993 and *O. turanicus* Uvarov, 1912. These three species have a median scutal tubercle, a TIII with 5–6 pairs of subapical spurs and no ventral apical spurs on TI or TII. These species lack the dark markings on the tegmina and the diagnostic colouration of *O. castaneus* sp. nov.; they all are pale, plain straw-coloured or greenish. *O. dulcisonans* and *O. turanicus* are significantly larger (14–17 mm in males).

Description. Male holotype. Like other species within the genus *Oecanthus*, it is slender-bodied and fragile (Figs 162, 163). ***Head*:** weakly prognathous (Fig. 164A); head and pronotum with a light mid-line bordered by two thin dark lines (Fig. 164B); no black postocular marking; scape and pedicel with a small black spot on their ventral face (Fig. 164A); black dot on the scape sometimes very weak; spot on the pedicel somewhat thickened or callous. ***Pronotum*:** as wide as long, sometimes slightly wider than long (Table 8); saddle-shaped with ventral caudal corners of the paranotal lobes strongly curved inwards; hind margin slightly undulated, with bristles (Fig. 164B). ***Metanotal gland*:** metascutum and metascutellum both well-modified and of more or less equal length (Fig. 166); main scutal relief inverted U-shaped with slightly swollen anterior and lateral margins (Fig. 166a); posteriorly, with two posterad projecting flat processes, both with a tuft of long setal brushes on both sides of their apex; a deep transverse depression situated beneath the two processes; scuto-scutellar suture obtusely trapezoid (Fig. 166b); main scutellal relief V-shaped, smaller than the scutum (Fig. 166c), with a U-shaped depression in its anterior face; anterior margin of the scutellum, along the scuto-scutellar suture, with a pair of posterad, hook-like processes, bearing some setae; posterior margin of the scutellum with an obtuse angle; a median scutal tubercle is absent. ***Right tegmen*:** veins light; tegmina marked more or less extensively blackish-brown; base of the tegmina dark brown due to the infumation of the cells and margins of the veins; cells bordering the file and the plectrum intensively marked dark brown; chordal area with a large brown spot; cells in the dorsal field thinly margined brown along the veins and variably and locally marked

Table 8. Morphometrics of *Oecanthus castaneus* sp.nov. and *O. chopardi* Uvarov, 1957. An asterisk (*) indicates a significant difference (all $p < 0.01$); values in mm.

Character	Sex	*O. castaneus* sp. nov.	*O. chopardi*
Body length	Male	11.2 (9.6–11.7; n = 8)	11.3 (11.2–11.4; n = 2)
	Female	10.9 (9.5–11.8; n = 3)	11.8 (11.2–12.4; n = 2)
Pronotal length	Male	1.8 (1.6–1.9; n = 12)	1.9 (1.8–2.0; n = 3)
	Female	1.8 (1.6–1.9; n = 8)	1.9 (1.8–2.0; n = 5)
Pronotal width	Male	1.9 (1.7–2.1; n = 12)	1.9 (1.8–2.0; n = 3)
	Female	1.8 (1.6–1.9; n = 8)	1.9 (1.9–2.1; n = 5)
Cercus length	Male	3.7 (3.3–4.2; n = 8)	4.3 (3.4–4.9; n = 3)
	Female	3.8* (3.5–4.0; n = 3)	5.1* (4.4–5.6; n = 5)
Tegmen length (right)	Male	9.7* (8.9–10.5; n = 14)	10.9* (10.6–11.2; n = 5)
	Female	10.0* (9.4–10.7; n = 8)	11.6* (11.3–12.0; n = 5)
Tegmen width dorsal field (right)	Male	3.3* (2.9–3.7; n = 14)	4.0* (3.9–4.0; n = 5)
Tegmen total wdth (right)	Male	5.1* (4.8–5.2; n = 7)	6.0* (5.7–6.3; n = 4)
Stridulatory file length (right)	Male	1.4 (1.3–1.4; n = 8)	1.7 (n = 3)
Stridulatory teeth number (right)	Male	50 (45–54; n = 7)	59 (n = 1)
FIII length	Male	6.8 (5.9–7.3; n = 13)	7.1 (6.9–7.4; n = 4)
	Female	6.7 (6.3–7.1; n = 8)	7.7 (7.4–8.0; n = 5)
Ovipositor length	Female	4.1* (3.9–4.3; n = 8)	5.4* (5.1–5.7; n = 5)

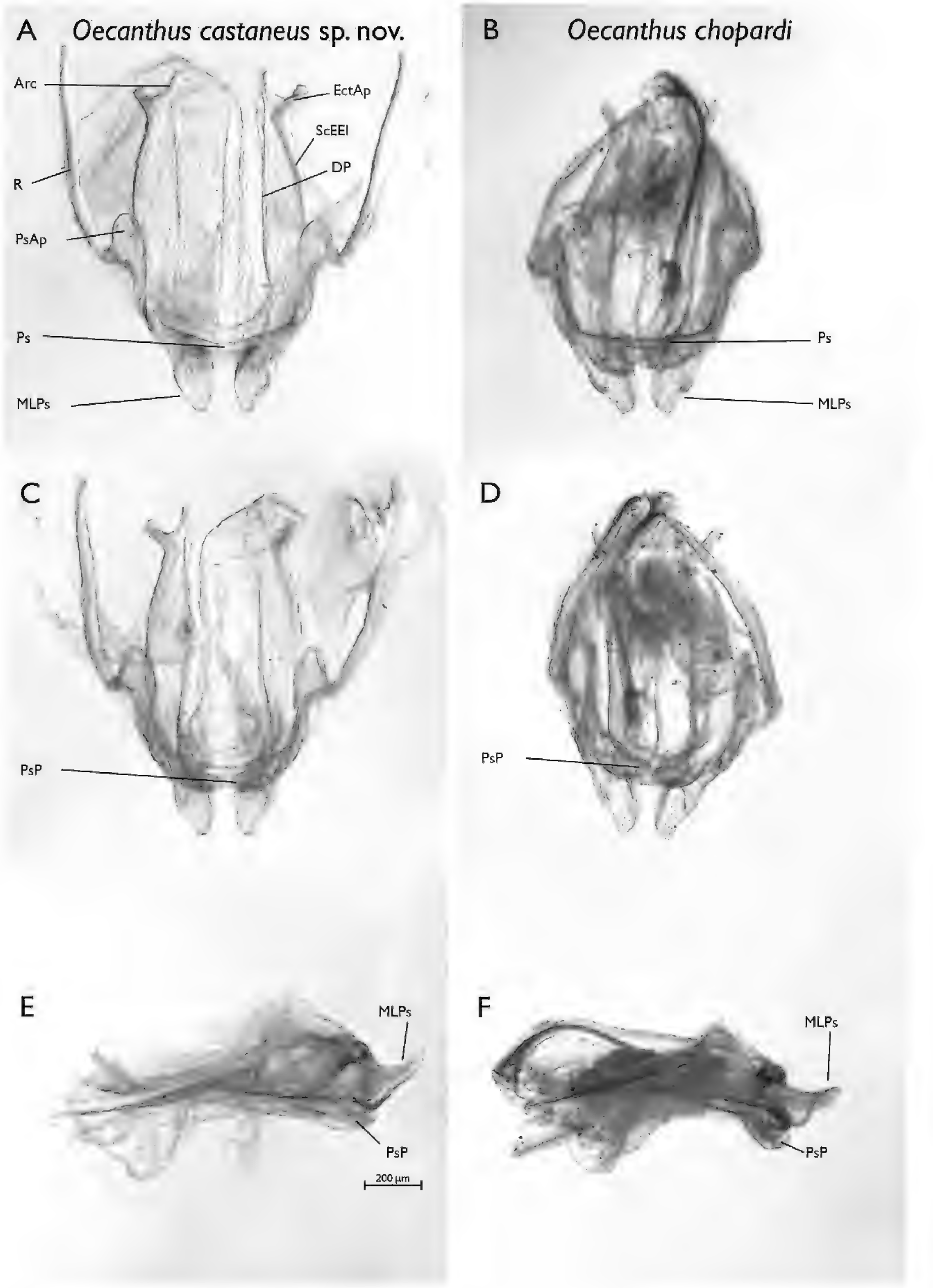

Figure 168. *Oecanthus castaneus* Felix & Bouwman, sp. nov. and *O. chopardi* Uvarov, 1957, phallic complex of males. **A, B.** Dorsal view, anterior end on top; **C, D.** Ventral view; **E, F.** Lateral view, anterior end on the left. Abbreviations: DP: Distal Prolongation of the Arc; EctAp: Ectophallic Apodeme; MLPs: Main Lobes of the Pseudepiphallus; Ps: Pseudepiphallus; PsAp: Pseudepiphallic Apodemes; PsP: Pseudepiphallic Parameres; R: Ramus; ScEEI: Lateral Sclerotisation of the Epi-Ectophallic Invagination; SpRF09YE323 (**A, C, E**), SpRF09YE447 (**B, D, F**); Scale bar: 200 µm (photographs Rob Felix and Jaap Bouwman).

with smooth infumation (Fig. 167A, C). ***Stridulatory file*:** stridulum with 54 teeth, situated on a proximally sharply raised ridge, which gradually descends to the same level as the anal vein towards the plectrum (Fig. 167C). ***Hind wings*:** light-coloured, apex brown, surpassing the tegmina with 2.2 mm. ***Legs*:** TI with an oval inner and outer tympanum; TI with an outer, apical, ventral spur; TII with an inner, apical, ventral spur (Fig. 164E). Fore- and mid-legs with scattered small black spots (Figs 162, 163); FIII with thinly distributed small black spots on the lateral and dorsal outer surface and with black markings on the ventrolateral carinae (Fig. 164C); TIII with two outer and three inner, dorsal, subapical spurs (Fig. 164F), serrulated over the entire length, with small, but thick spines on the tibiae's dorsal margins; serrulation denser in the basal than in the apical part; inner serrulation: no spine before the first subapical spur, 0 spines between the first and second spur, 1–2 spines between the second and third spur and 12–13 above the third spur; outer serrulation: 2–3 spines before the first subapical spur, 3–4 spines between the first and second spurs and 13–14 spines above the second spur; inner, apical three times shorter than inner, apical, dorsal spur; inner, apical, dorsal spur two times longer than outer, apical, dorsal spur; spurs and spines dark; ventral lobe of the hind knee dorsally lined black (Fig. 165A). ***Abdomen*:** cerci slightly sinuous in both the basal and apical fifth and densely covered with long hairs (Fig. 164D); subgenital plate with a rounded apex (Fig. 164C). ***Genitalia*:** Pseudepiphallic sclerite is a narrow transverse bridge that is widely U-shaped; the anterior margin is slightly curved in dorsal view. Main lobes (MLPs.) placed on the posterior margin, more or less diamond-shaped in dorsal view, with rounded inner sides and angled outer sides; in lateral view, MLPs angled obliquely up- and backwards, resembling two triangular blades or scoops; inner space between the two main lobes slightly smaller than the width of one lobe at its base. Two widely-rounded, triangular pseudepiphallic apodemes (Ps.Ap.) directing anteriorly. Pseudepiphallic parameres (Ps.P.) much shorter than MLPs., rounded apically and directed inwards. Rami long and slender; arc projecting anteriorly, with two long distal prolongations and two short ectophallic apodemes (Ec. Ap.) (Fig. 168).

***Colouration*:** sides of the head yellowish to orange, dorsally orange-brown to brown; eye colour orange-light reddish-brown (*in vivo*); scape and pedicel orange to orange-brown, the remaining antennomeres blackish brown; tarsi, tibiae and femora light yellow to orange-brown, gradually darkening towards the joints (Figs 162, 163); abdominal tergites largely coloured dark brown with light margins (Figs 162, 163); sternites light; cerci light; subgenital plate mottled brown at its base, rest light yellow.

***Morphometrics holotype*.** Body length (anterior margin labrum – apex subgenital plate): 11.7 mm; pronotal length: 1.9 mm; pronotal width: 2.0 mm; right tegmen length: 10.3 mm; width dorsal field right tegmen: 3.6 mm; total width right tegmen: 5.4 mm; cercus length: 4.2 mm; FIII length: 7.1 mm; TIII length: 8.0 mm; stridulatory file length 1.4 mm; stridulatory teeth number 54.

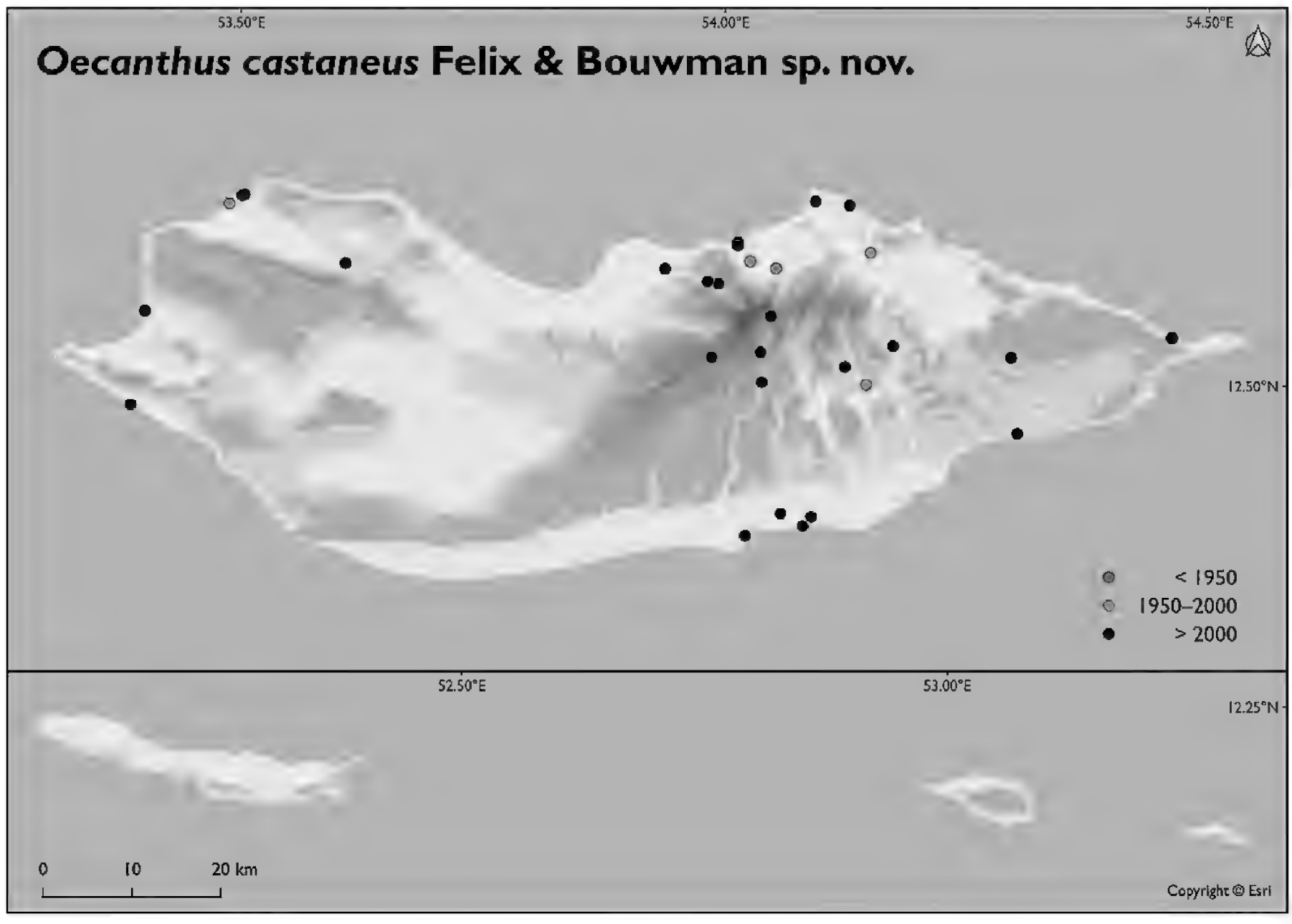

Figure 169. Distribution of *Oecanthus castaneus* Felix & Bouwman, sp. nov. in the Socotra Archipelago.

Female. Same as male, except for the following characteristics: tegmina dark brown on the dorsal and lateral fields, translucent along the transition between the dorsal and lateral fields; due to light underwings, tegmina appear to be striped (Fig. 172); ovipositor short, apex denticulated; cerci slightly surpassing the apex of the ovipositor (Fig. 165C); subgenital plate triangular with a rounded apex.

Biometrics of holo- and paratypes are shown in Table 8.

Variation. In the paratype series, the extent of black markings varies, whether on the wings, legs or antennae and may fade in dried specimens. See Table 8 for variation in biometrics in the paratype series.

Discussion. Based on its characteristics, mainly the ventral apical spurs on both TI and TII, *O. castaneus* sp.

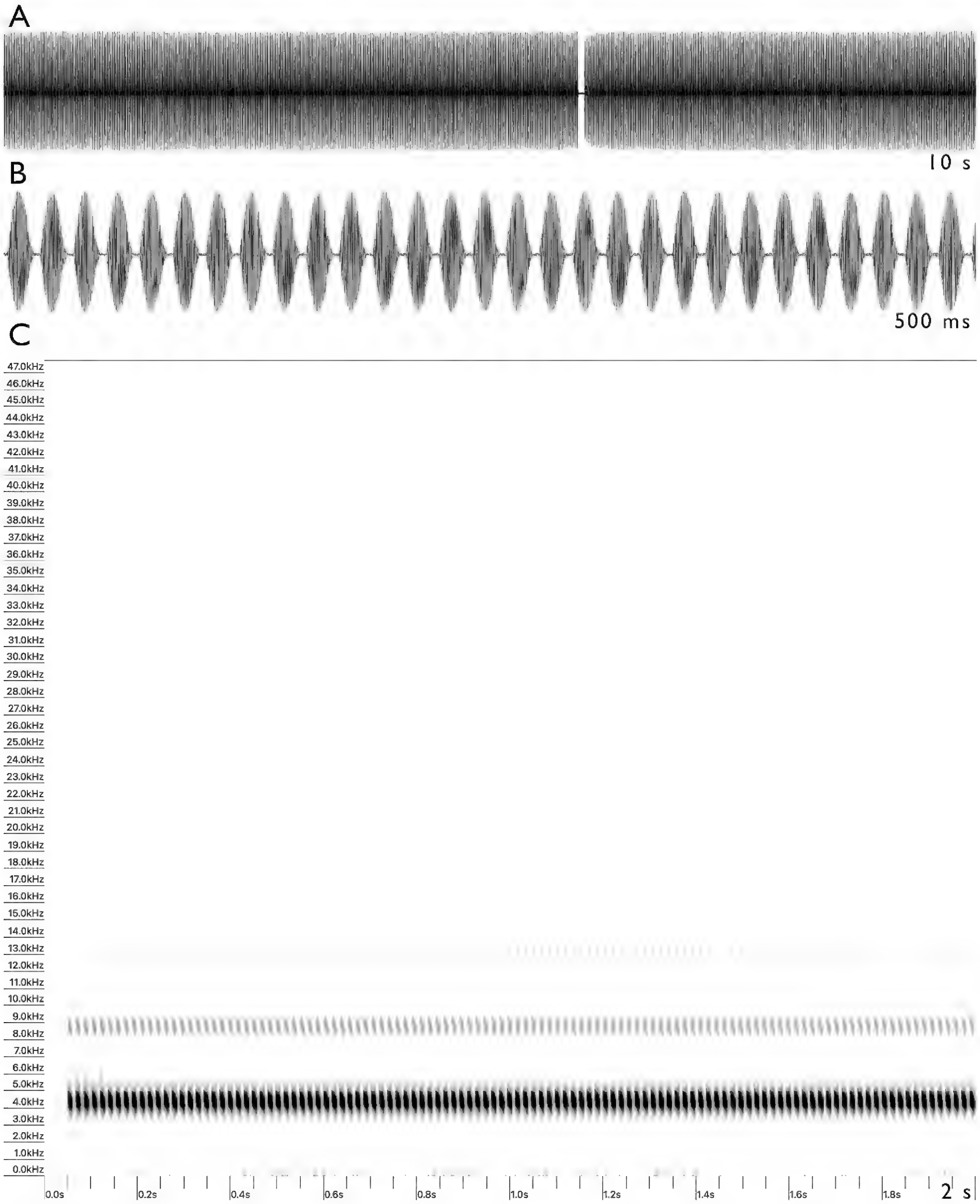

Figure 170. Calling song of *Oecanthus castaneus* Felix & Bouwman, sp. nov. paratype. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Hadiboh, 3 Nov 2010, 18:03 h; RecRF10206; SpRF10YE119.

nov. (and *O. chopardi*) might merit assignment to *Viphyus* or a new genus close to the latter. However, taxonomic changes at this level should preferably be accompanied by a thorough phylogenetic analysis, based on DNA. Therefore, we tentatively describe the species here as a member of *Oecanthus* and leave the decision about the generic placement of both *Oecanthus* species from Socotra to a future study.

Etymology. *Oecanthus castaneus* Felix & Bouwman, sp. nov. is named after its warm brown appearance due to a combination of orange and brown hues. This characteristic distinguishes the species immediately from *O. chopardi*, the other tree cricket species on the island.

Distribution and occurrence. Endemic to Socotra. The species occurs throughout the island and is common, possibly less so higher in the mountains (Fig. 169).

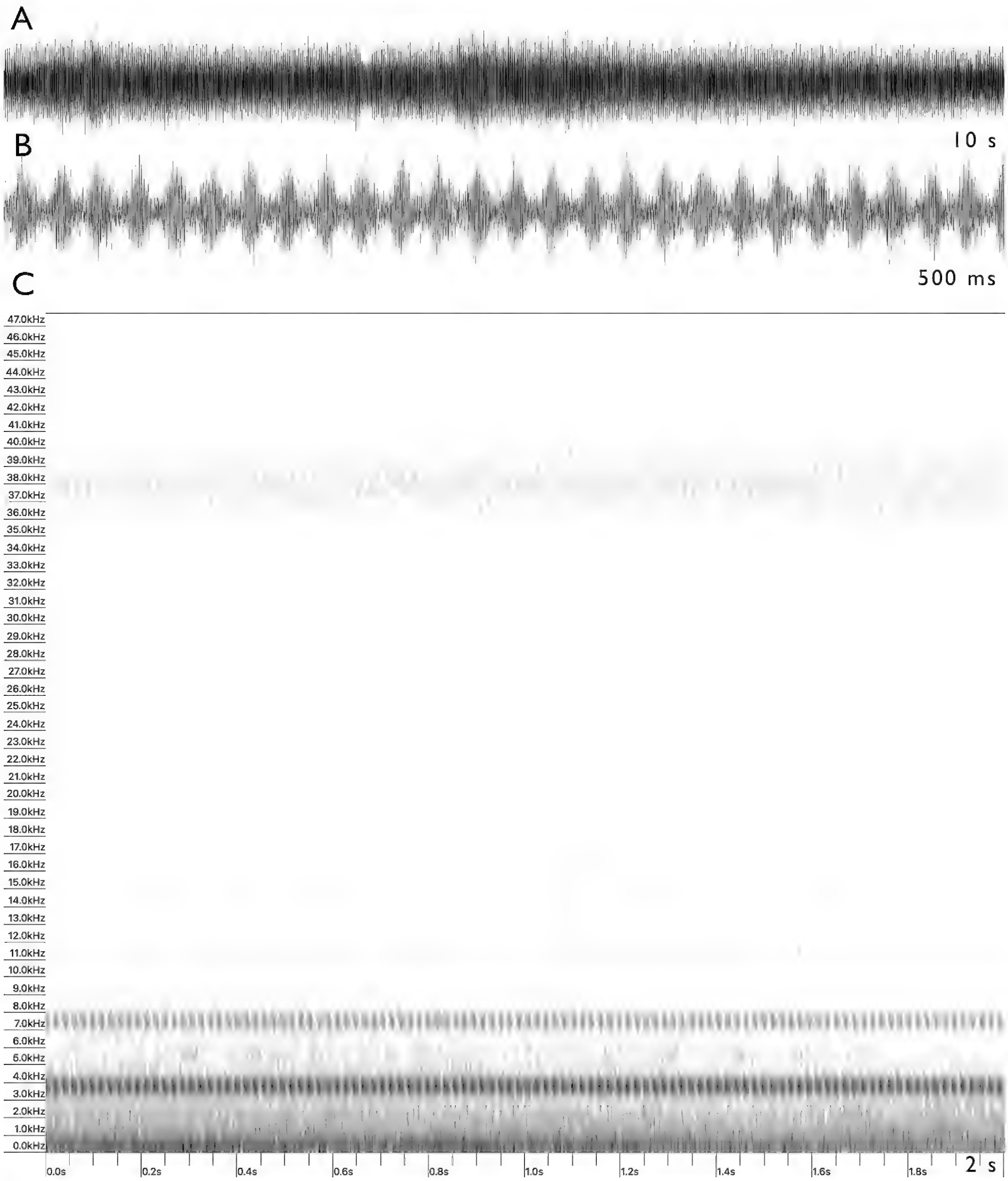

Figure 171. Calling song of *Oecanthus castaneus* Felix & Bouwman, sp. nov. Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**); Neet, Socotra, 29 Oct 2010, 04:23 h; RecRF10129. The song of *O. castaneus* sp. nov. is similar to the song of *Oecanthus dulcisonans* from the Mediterranean Basin. However, based on the available information on *Oecanthus* songs in northern Africa and the Arabian Peninsula, no other species with a similar continuous song is known in this part of the world.

Figure 172. *Oecanthus castaneus* Felix & Bouwman, sp. nov., female sipping from male's metanotal gland. Ditwah Lagoon, Socotra, 28 Feb 2009. In *Croton socotranus* (photograph Rob Felix).

Habitat and biology. The species occurs in all vegetated habitats, from 0–900 m a.s.l. and can be found in herbs, shrubs and trees like *Jatropha unicostata* and *Croton socotranus*. Records are from all seasons.

Bioacoustics. The calling song of *Oecanthus castaneus* Felix & Bouwman, sp. nov. is a continuous echeme, sometimes mixed with very short silences (50–100 ms) (Figs 170A, 171A). Echemes consist of equal syllables, repeated at 48–60 per second (Figs 170B, 171B). The carrier frequency of the song is around 3.7–4.4 kHz and has few harmonics at higher frequencies (Figs 170C, 171C).

Remarks. Chintauan-Marquier et al. (2016) genetically analysed a specimen from Ayhaft. It is mentioned there as *Oecanthus chopardi*, the only species known to the island at the time of publication. The same applies to De Campos et al. (2022). Sequences of *O. castaneus* sp. nov. are stored in GenBank (as *O. chopardi*) with voucher numbers KR904148.1, KR903784.1, KR903493.1, KR903270.1 and KR902990.1.

Oecanthus chopardi Uvarov, 1957

Figs 165, 167, 168, 173–177

References for Socotra. Burr 1903: 412, 423 [as *Oecanthus pellucens*]; Krauss 1907: 17, 27, 30 [*partim*; as *O. indicus*]; Uvarov (in Uvarov and Popov (1957)): 364–365 [*partim*]; Walker 1966: 270; Gorochov 1993: 92 [*partim*?]; Wranik 2003: 316, plates 146, 149 [*partim*]; Chintauan-Marquier et al. 2016: 60, 70 [is *Oecanthus castaneus* Felix & Bouwman, sp. nov.]; De Campos et al. 2022: 6 [is *Oecanthus castaneus* Felix & Bouwman, sp. nov.].

Diagnostic notes. See *Oecanthus castaneus* Felix & Bouwman, sp. nov.

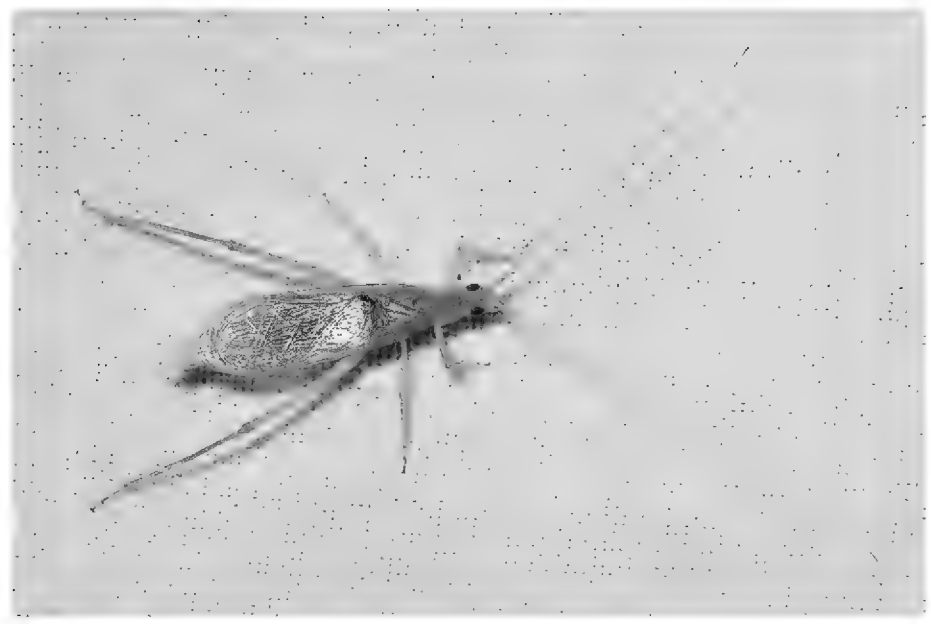

Figure 173. *Oecanthus chopardi* Uvarov, 1957, male in light trap. Ayhaft, Socotra, 22 Feb 2009 (photograph Rob Felix).

Taxonomic notes. *O. chopardi* was described by Uvarov (in Uvarov and Popov (1957)), based on four specimens from Wadi Dineghen, including the holotype (Fig. 174) and one paratype from Maabad. About that last paratype, Uvarov (in Uvarov and Popov (1957)) mentioned the following: "There is some variation in the brown elytral pattern of the male; the male from Moabbadh plain [Maabad] is marked very heavily its head, pronotum and antennae being blackish-brown". In the collection of the NHMUK, this is written on a note by Bruce Townsend: "wing pattern of the fifth syntype [= fourth paratype; Maabad] differs markedly from that of the other four and it is clearly a different species".

The paratype from Maabad is assigned here as a paratype of *Oecanthus castaneus* Felix & Bouwman, sp. nov. Krauss (1907) also mentioned two different colour types within the specimens collected by Simony. After examination of these specimens, two belong to *O. chopardi* and two to *O. castaneus* sp. nov.

All specimens collected by Guichard in 1967, mentioned by Gorochov (1993) as *O. chopardi*, belong to *O. castaneus* sp. nov. Gorochov (1993) further mentioned three specimens (2♂, 1♀) collected by Kurzenko in 1984, the specific status of which is unknown to us. Wranik (2003) depicted *O. castaneus* sp. nov. instead of *O. chopardi* (plates 146, 149).

All *Oecanthus* material from Socotra in Massa's collection belongs to *O. castaneus* sp. nov., except for two female specimens from Samha Is. These females are yellowish-white and might belong to *O. chopardi* or a third species. Further study must reveal the specific status of the taxon present on that island.

Distribution and occurrence. *O. chopardi* is endemic to Socotra and is found at several sites in the Hagher and Maaleh Mountains (Fig. 175). Records are few and *O. chopardi* may well be a scarce species.

The labels of the type specimens mention Deneghan, 300 ft (ca. 91 m), while Uvarov (in Uvarov and Popov (1957)) mentions 3000 ft (ca. 914 m) instead, which is on Adho Dimello. Later, Popov (1984) mentioned 300 ft (ca. 91 m). We consider the latter as correct (see Discussion).

Figure 174. *Oecanthus chopardi* Uvarov, 1957, male, holotype. Scale bar: 1 cm (photograph Rob Felix).

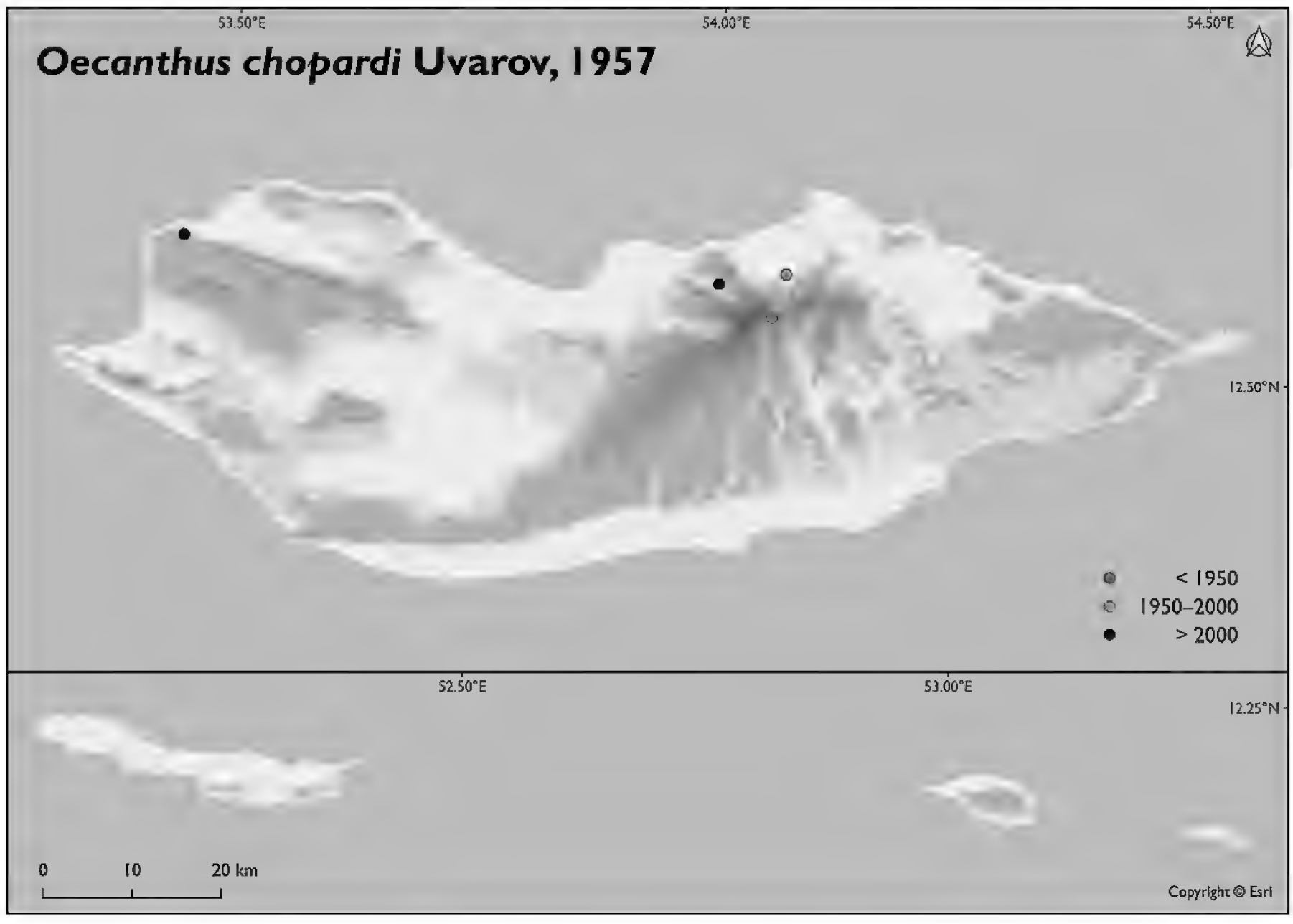

Figure 175. Distribution of *Oecanthus chopardi* Uvarov, 1957 in the Socotra Archipelago.

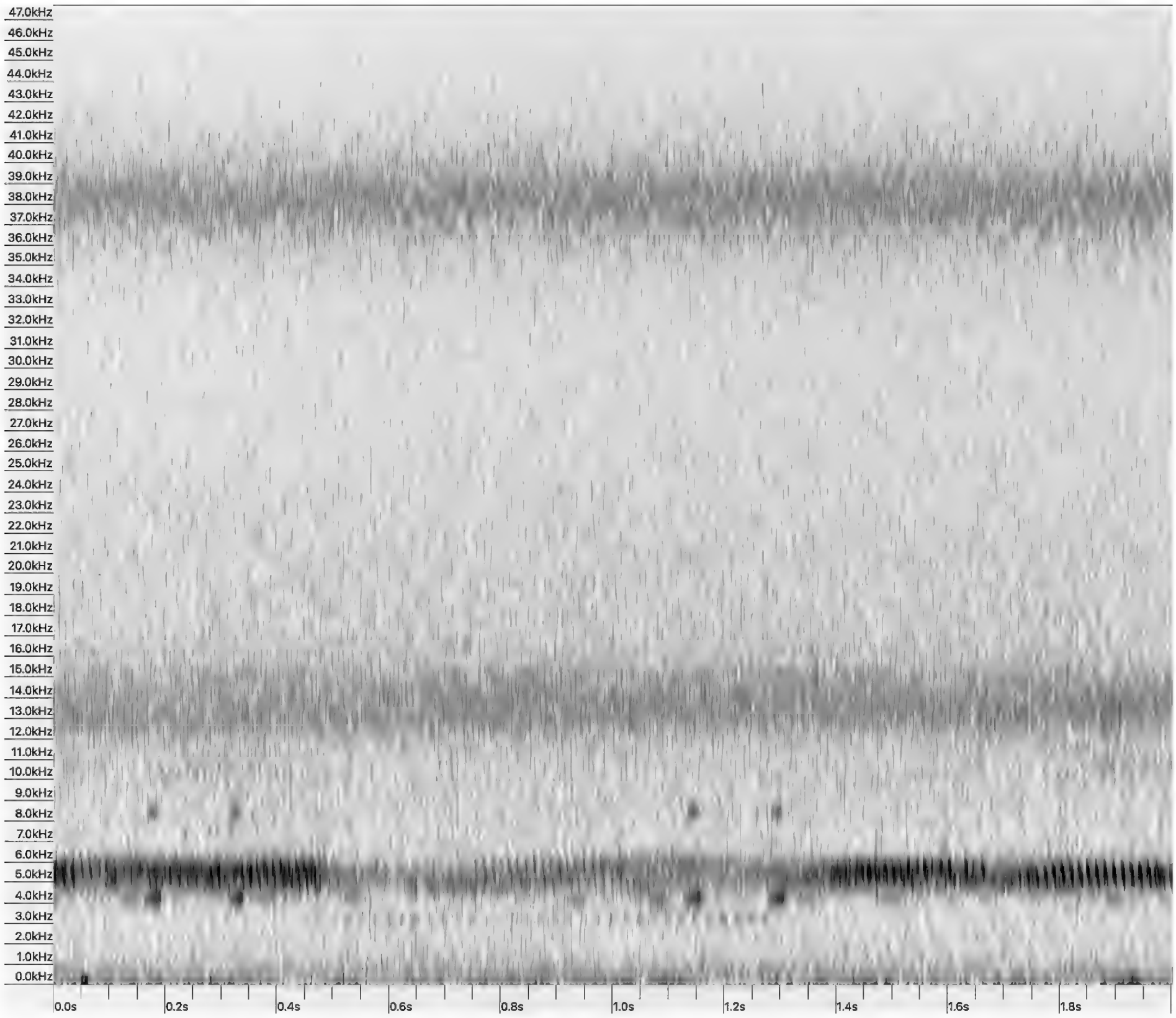

Figure 176. Possible calling song of *Oecanthus chopardi* Uvarov, 1957. Spectrogram depicting 2 s with a carrier frequency around 3 kHz. Accompanying species shown are *Ectatoderus* sp. 2 (carrier frequency around 4 kHz) and *Modicogryllus perplexus* Cade & Otte, 1984 (carrier frequency around 5 kHz), with faint traces of *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906) (carrier frequency around 13 kHz); RecRF10151.

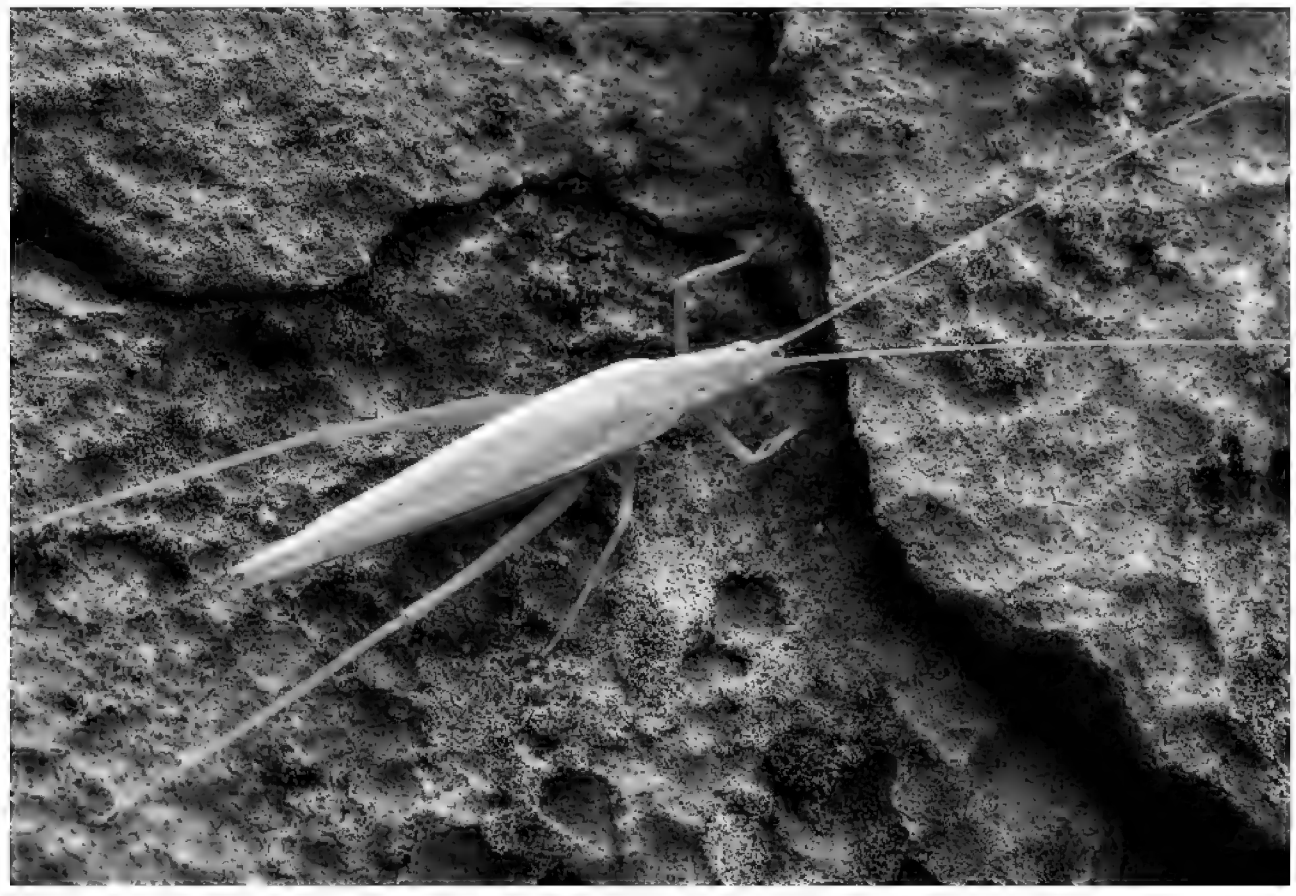

Figure 177. *Oecanthus chopardi* Uvarov, 1957, female. Maaleh, Socotra, 9 Feb 2024 (photograph James Bailey).

Habitat and biology. The species is restricted to well-wooded habitats in the zones with Frankincense woodland and forest, montane forest and mosaic. They were collected in a light trap. Records are from 90–914 m a.s.l. and February and March only.

Bioacoustics. The calling song of *Oecanthus chopardi* has not been described so far. We also have not been able to record and subsequently collect a specimen of this species. However, in one sound recording from Adho Dimello high in the Hagher, we heard an alleged *Oecanthus* species, clearly different from *Oecanthus castaneus* Felix & Bouwman, sp. nov. We assume it could be possible that the song in the recording is from this species. The song recorded consists of echemes lasting 800–850 ms and is repeated not very frequently. Echemes consist of about 35 syllables, repeated at about 40 per second. The carrier frequency is 3.2 kHz.

Remarks. Chintauan-Marquier et al. (2016) genetically analysed an *O. castaneus* sp. nov. specimen from Ayhaft. However, they published it as *Oecanthus chopardi*, the only species known to the island at the time of publication (see *O. castaneus* sp. nov.).

Phalangopsidae
Phalangopsinae

Socotracris kleukersi Felix & Desutter-Grandcolas, 2012

Figs 178, 179

References for Socotra. Desutter-Grandcolas and Felix 2012: 57–65; Chintauan-Marquier et al. 2016: 62, 69, 72; Hugel et al. 2021: 204.

Diagnostic notes. *Socotracris kleukersi* is the only known cave-dwelling cricket on Socotra. It is unmistakable for its light colour, with an apparent orange head and long legs. Males have dark brown tegmina reaching tergite III (Fig. 178) and females have small, scale-like tegmina reaching the distal margin of the metanotum.

Figure 178. *Socotracris kleukersi* Felix & Desutter-Grandcolas, 2012, male at the type locality. Cave Wadi Zerik, Socotra, 6 Nov 2010 (photograph Rob Felix).

Taxonomic notes. *Socotracris* Desutter-Grandcolas, 2012 is a monotypic phalangopsid cricket genus whose taxonomic position is close to *Homoeogryllus* Guérin-Méneville, 1847 and *Meloimorpha* Walker, 1870, settled together with *Phaeogryllus* Bolívar, 1912 and most members of Gryllomorphini forming one clade (Chintauan-Marquier et al. 2016).

Distribution and occurrence. Endemic to Socotra. Only known with certainty from the type locality (Fig. 179). One juvenile of possibly the same species, depicted in Cheung and DeVantier (2006), was collected in 2004 in Dilhaile Cave, Dixam Plateau, four kilometres from the type locality (K. Van Damme, in litt.). The two sites are located in strongly karstified limestone, which would allow the species to disperse by a subterranean network.

In 2009, we visited some other caves: Hoq Cave (12.5877°N, 54.3545°E) at Momi Plateau and Dejub Cave (12.3849°N, 54.0156°E) on the southern edge of Dixam, but no crickets were found (Desutter-Grandcolas and Felix 2012).

Habitat and biology. Specimens were found in a small cave on a cliff along the right bank of Wadi Zerik. The cave is approximately 30 m long and some 10 m high. Most individuals were found where external light was almost absent, two to four metres high on vertical walls. The species seemed less abundant in deeper parts of the cave.

On all three visits to the cave, the species appeared numerous, occurring in tens of individuals. On the visit on 21 Feb 2009, only nymphs were found. On both visits in November 2010, apart from tens of nymphs, several adults were collected. We did not observe any specimens outside the cave during the day.

The species may be active at night near the entrance of the cave. Due to the habitat, *S. kleukersi* can be defined as troglobitic, confirmed by its light colouration and reduced eyes.

S. kleukersi is predated by spiders. Potential other predators present in the cave are bats (*Rhinopoma cystops* ssp. *arabium*) and whip spiders (Amblypygi, Charinidae) (Desutter-Grandcolas and Felix 2012).

Bioacoustics. Based on a well-developed stridulatory file, the species is expected to produce sound, but the authors never observed it.

Remarks. One of the paratypes has been genetically analysed by Chintauan-Marquier et al. (2016) and stored in GenBank (accession numbers KR904052.1, KR903862.1, KR903700.1, KR903528.1, KR903357.1, KR903177.1, KR903026.1).

Trigonidiidae
Trigonidiinae

Trigonidium cicindeloides Rambur, 1838

Figs 180, 181

References for Socotra. Massa 2009: 53.

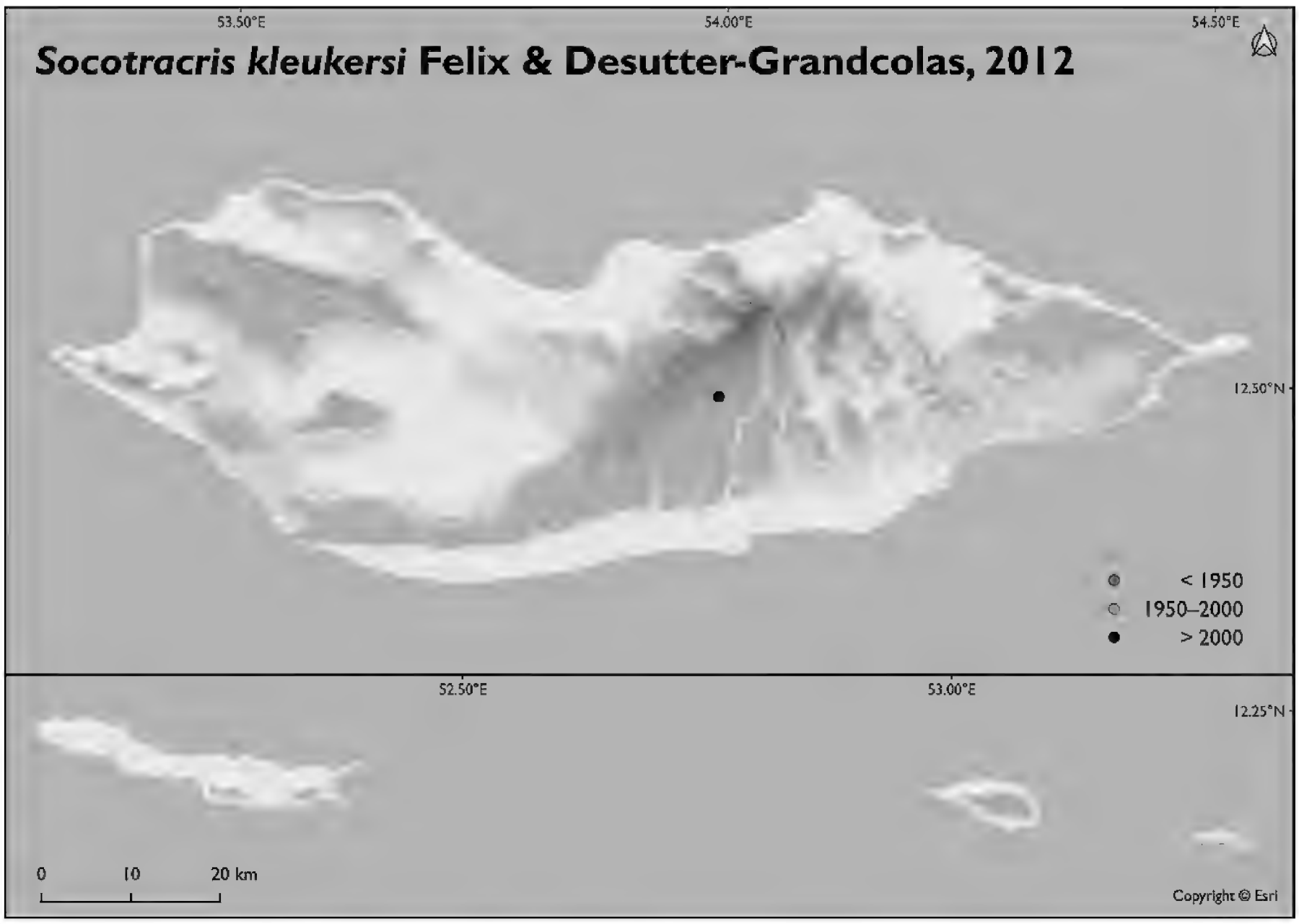

Figure 179. Distribution of *Socotracris kleukersi* in the Socotra Archipelago.

Figure 180. *Trigonidium cicindeloides* Rambur, 1838, female. Wadi Zerig, Socotra, 5 Nov 2010 (photograph Rob Felix).

Diagnostic notes. *Trigonidium cicindeloides* is an unmistakable little cricket with large eyes, a shiny black body and orange-brown hind legs and cerci (Fig. 180).

Distribution and occurrence. It is a widespread species in Africa, southern Europe, Asia and Arabia. Massa (2009) recorded it on Socotra. The only records are from Zerig and Zemhom, south of the Hagher (Fig. 181). The presence is most certainly overlooked and the species is probably more widely distributed in suitable habitats.

Habitat and biology. On Socotra, *Trigonidium* occurs in dense *Juncus* vegetations at 250–650 m a.s.l. (Fig. 6).

Gryllotalpoidea
Gryllotalpidae

Gryllotalpa aff. *G. africana* Palisot de Beauvois, 1820

Figs 182–184

References for Socotra. Uvarov and Popov 1957: 366; Townsend 1983: 183; Wranik 2003: 317, plate 149; Chintauan-Marquier et al. 2016: 58, 67.

Diagnostic notes. Mole crickets carry a highly distinctive morphology within Orthoptera, including modified forelegs built for digging (Figs 182, 183). The specific status of the mole crickets on Socotra is unclear.

We used Townsend's (1983) key to identify our male specimen collected in 2009 at Ridah, Momi. Most characteristics point to *G. africana*: the stridulatory teeth of the file are more widely spaced at the centre than at its extremities, the radius is divided distally into two branches and the phallic structure is large (3 mm). Unfortunately, our specimen's phallic structure is incomplete; only the pseudepiphallus, which is partly damaged, is present (Fig. 183C). It differs from the pseudepiphallus of *G. africana*, as depicted in Townsend (1983). It also differs from the pseudepiphalli of *G. unispina* Saussure, 1874, *G. gryllotalpa* (Linnaeus, 1758) and *G. stepposa* Zhantiev, 1991, as shown in Iorgu et al. (2016), while it is superficially similar to the one of *G. krishnani* Prassanna 2012, depicted in Prassanna et al. (2012) and Frank (2020).

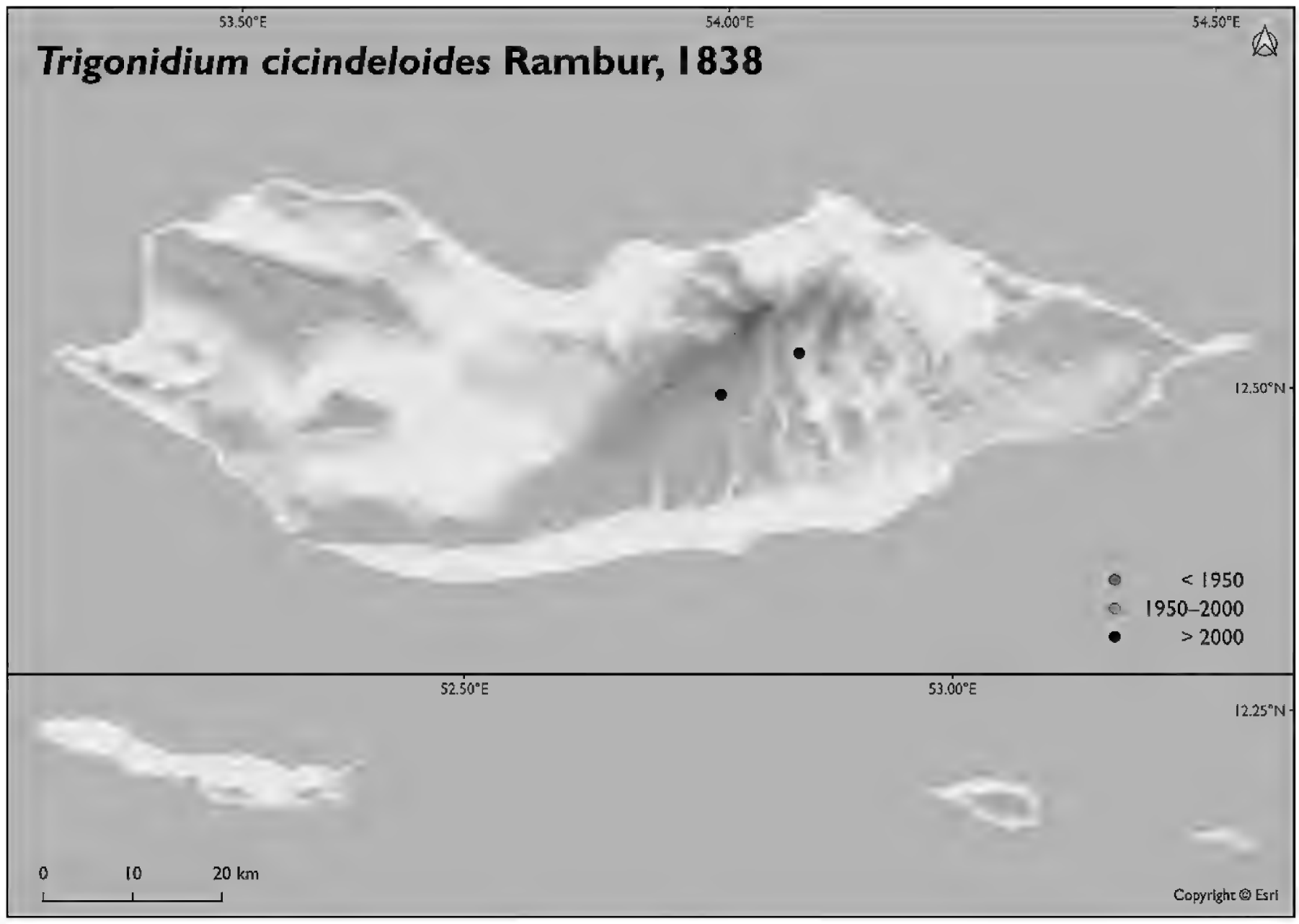

Figure 181. Distribution of *Trigonidium cicindeloides* Rambur, 1838 in the Socotra Archipelago.

Figure 182. *Gryllotalpa* aff. *G. africana* Palisot de Beauvois, 1820, female. Begobig, Socotra, 24 Feb 2009 (photograph Robert Ketelaar).

Taxonomic notes. Palisot de Beauvois (1820) described *Gryllotalpa africana* from several small specimens collected in Oware, a former kingdom bordering Benin (Palisot de Beauvois 1804).

Townsend (1983) revised the Afrotropical mole crickets and since the syntypes of *G. africana* were lost, he designated a neotype. He erroneously considered Oware to refer to a river running into Etosha Pan in northern Namibia. The nearest locality from Etosha, where he had specimens suitable as neotypes at his disposal, was South Africa. Therefore, the current *G. africana* with its neotype from South Africa may belong to a different taxon from Palisot de Beauvois' original syntypes from Oware (Benin).

For his revision, Townsend (1983) examined the Socotran *Gryllotalpa* specimens deposited in the NHMUK and identified them as *G. africana*. We only found specimens from the Oxford expedition in the London collection, not Popov's material (Uvarov and Popov 1957). It is not clear to us which material has been examined by Townsend and if, indeed, he examined the genitalia. Gorochov (1983), in his study on Arabian Grylloidea, examined several specimens of the *Gryllotalpa* in the collection of NHMUK, but he did not mention any from Socotra.

Since we only have one specimen with an incomplete phallic structure, we tentatively name it *Gryllotalpa* aff. *G. africana*, following Uvarov (in Uvarov and Popov (1957)) and Townsend (1983). A thorough study of the genitalia of the London specimens and preferably a new series of *Gryllotalpa* from Socotra is necessary to properly shed light on this matter.

Distribution and occurrence. *G. africana* is found throughout Africa, on the Canary Islands and mentioned for Socotra (Townsend 1983). Records on Socotra are from several sites across the island, from the lowlands and limestone plateaus to the Hagher (Fig. 184). Most historical records are from Hadiboh and the surrounding plain (Oxford expedition and Popov's specimens). Some tens of individuals were recorded at night in Feb 2009 at Qeysoh in the west and Momi Plateau in the east. On 30 Oct 2010, individuals were singing deep down the valley from the base camp at Adho Dimello.

Habitat and biology. Uvarov (in Uvarov and Popov (1957)) mentioned beds of shallow, stagnating, permanent

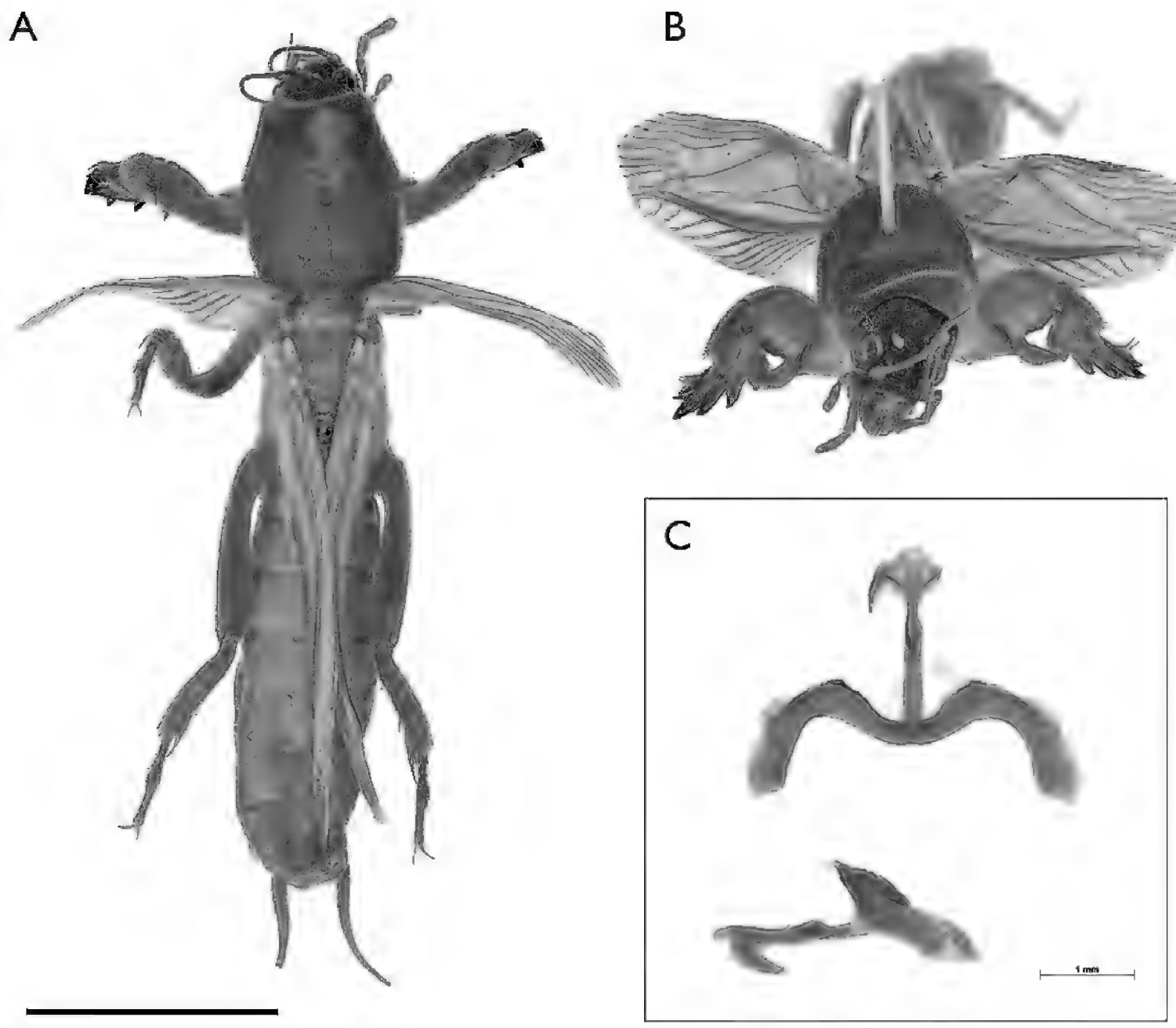

Figure 183. *Gryllotalpa* aff. *G. africana* Palisot de Beauvois, 1820, male. Begobig, Momi Plateau, Socotra, 24 Feb 2009. **A.** Dorsal view; **B.** Frontal view and tegmina; **C.** Pseudepiphallus, dorsal and lateral view. Scale bars: 1 cm (**A, B**); 1 mm (**C**). SpRF09YE312 (photographs Yvonne van Dam and Rob Felix).

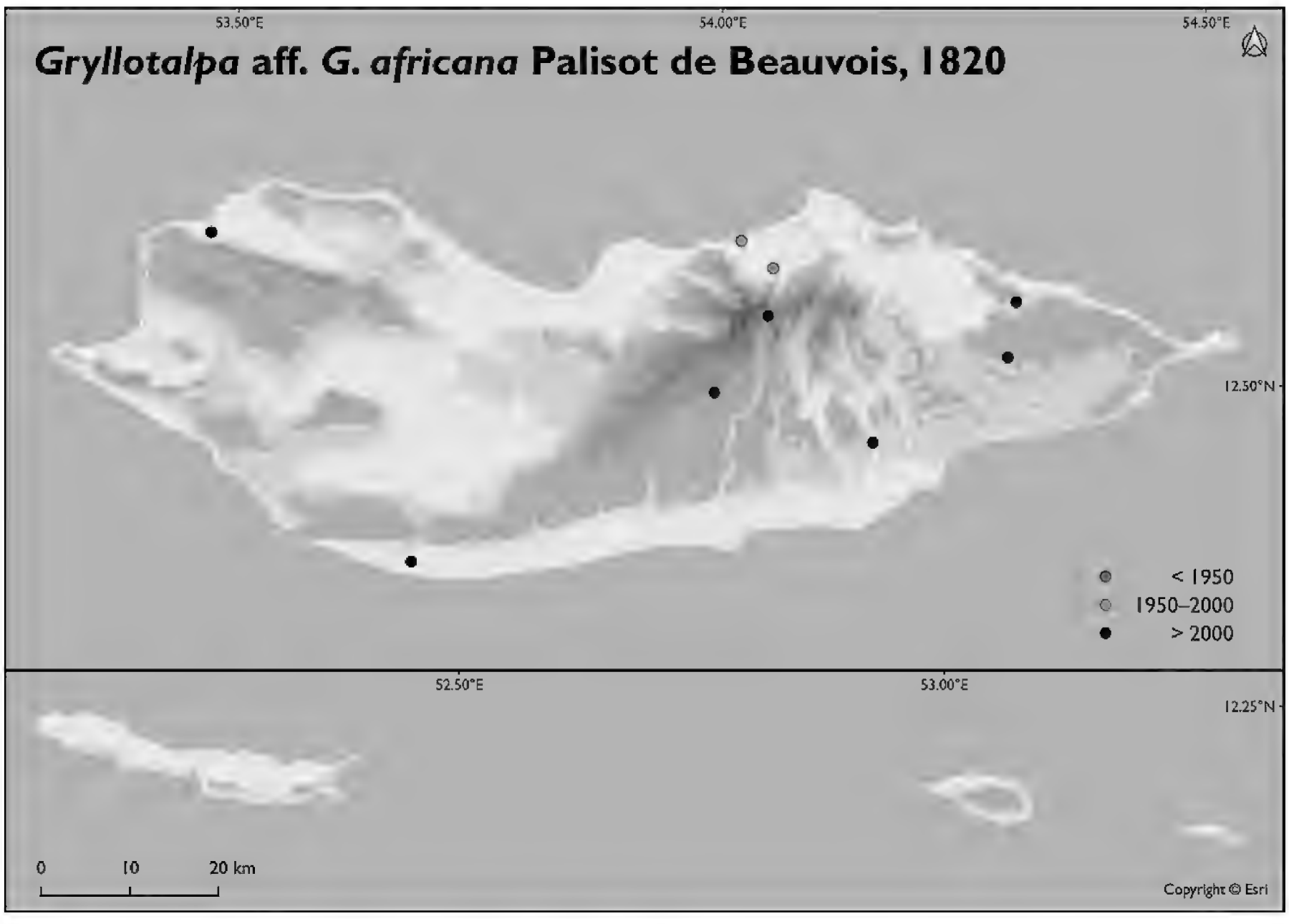

Figure 184. Distribution of *Gryllotalpa* aff. *G. africana* Palisot de Beauvois, 1820 in the Socotra Archipelago.

streams overgrown with *Juncus* and sedges as the primary habitat on Socotra (Fig. 6). In 2009 and 2010, we found *Gryllotalpa* in wet soils along stagnant waters with *Juncus* (Zerig), semi-dry wadis (Momi) and grassy spring areas (Adho Dimello and Qeysoh). On Socotra, *Gryllotalpa* occurs at a wide elevational range of 60–1000 m a.s.l. The species is attracted to light. Male territories are often easily located due to the loud-calling songs. However, burrows often occur underground from wet riverbanks or submerged in marsh, where they can be difficult to pinpoint.

Bioacoustics. The song of *Gryllotalpa* on Socotra is a loud, raucous trill given from a burrow, similar to other species in the genus. The sound is given nocturnally and can be challenging to locate. Unfortunately, we did not make a recording.

Remarks. Our specimen from Momi has been genetically analysed by Chintauan-Marquier et al. (2016). Sequences are stored in GenBank as *G. africana*, with voucher numbers KR903963.1 and KR903445.1.

Stenopelmatoidea
Gryllacrididae
Gryllacridinae
Ametroidini

Glomeremus Karny, 1937

Remarks. The genus *Glomeremus* Karny, 1937 contains sixteen species in mainland Africa and Reunion, Mauritius and Socotra (Cigliano et al. 2024a). Hugel et al. (2010) and Cadena-Castañeda (2019) propose that the genus is likely polyphyletic, suggesting that the island species might warrant classification under a distinct genus. On Socotra, three species occur. *Glomeremus pileatus* (Krauss, 1902) is strongly related to *G. capitatus* Uvarov, 1957, whereas *G. mediopictus* Uvarov, 1957 differs strongly from the former two in the shape of terminalia and wings and may even merit placement in a separate genus.

Glomeremus capitatus Uvarov, 1957

Figs 185–190

References for Socotra. Uvarov (in Uvarov and Popov (1957)): 361–362, fig. 3; Popov 1984: 197, fig. 73; Wranik 2003: 312, plate 148; Cadena-Castañeda 2019: 55, 84.

Figure 185. *Glomeremus capitatus* Uvarov, 1957, male. Wadi Darho, Socotra, 1 Feb 2024 (photograph James Bailey).

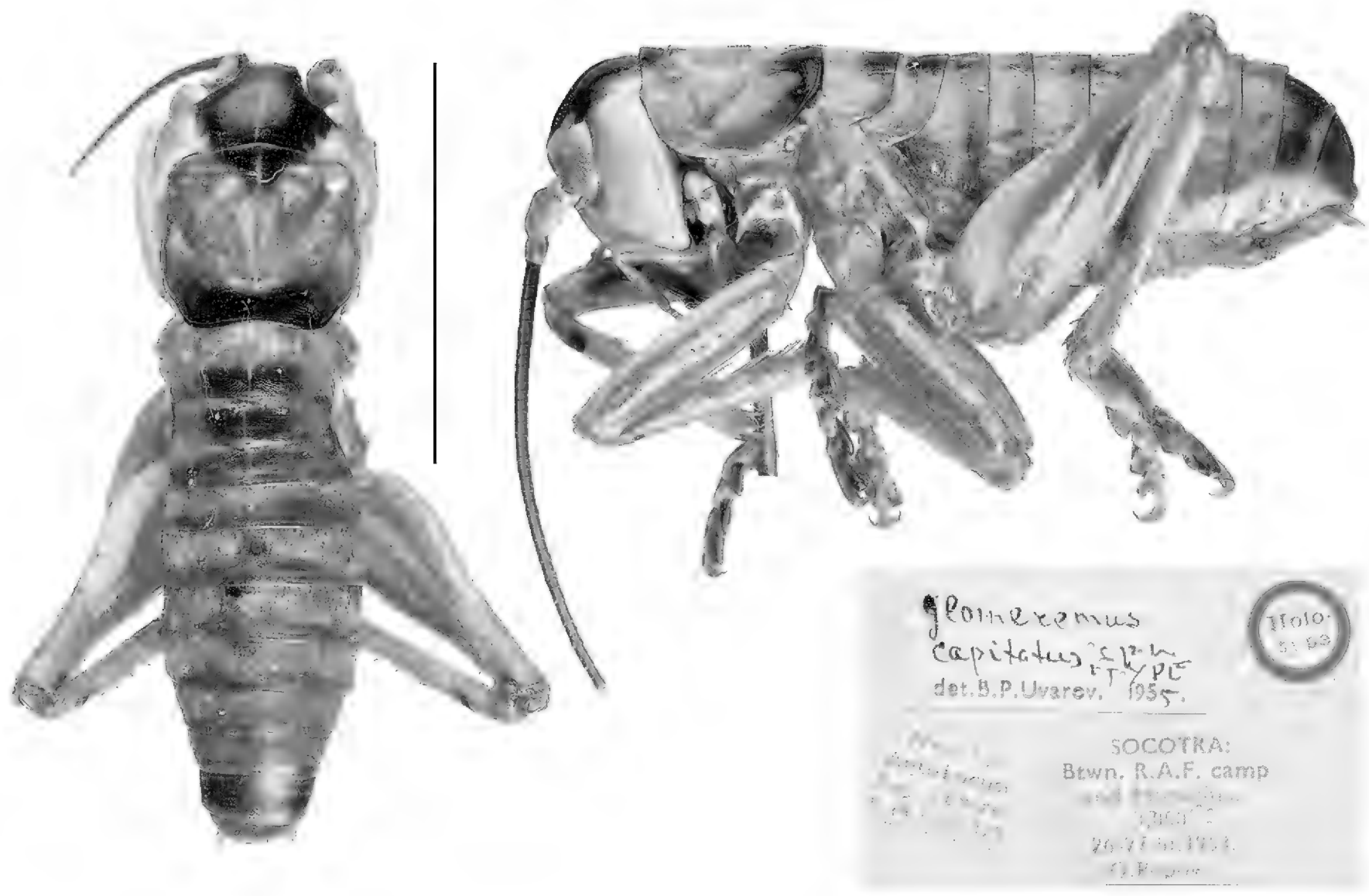

Figure 186. *Glomeremus capitatus* Uvarov, 1957, male, holotype. Presumably, it is a late instar nymph, collected at Dixam, Socotra by Popov in 1953. Scale bar: 1 cm (photograph Rob Felix).

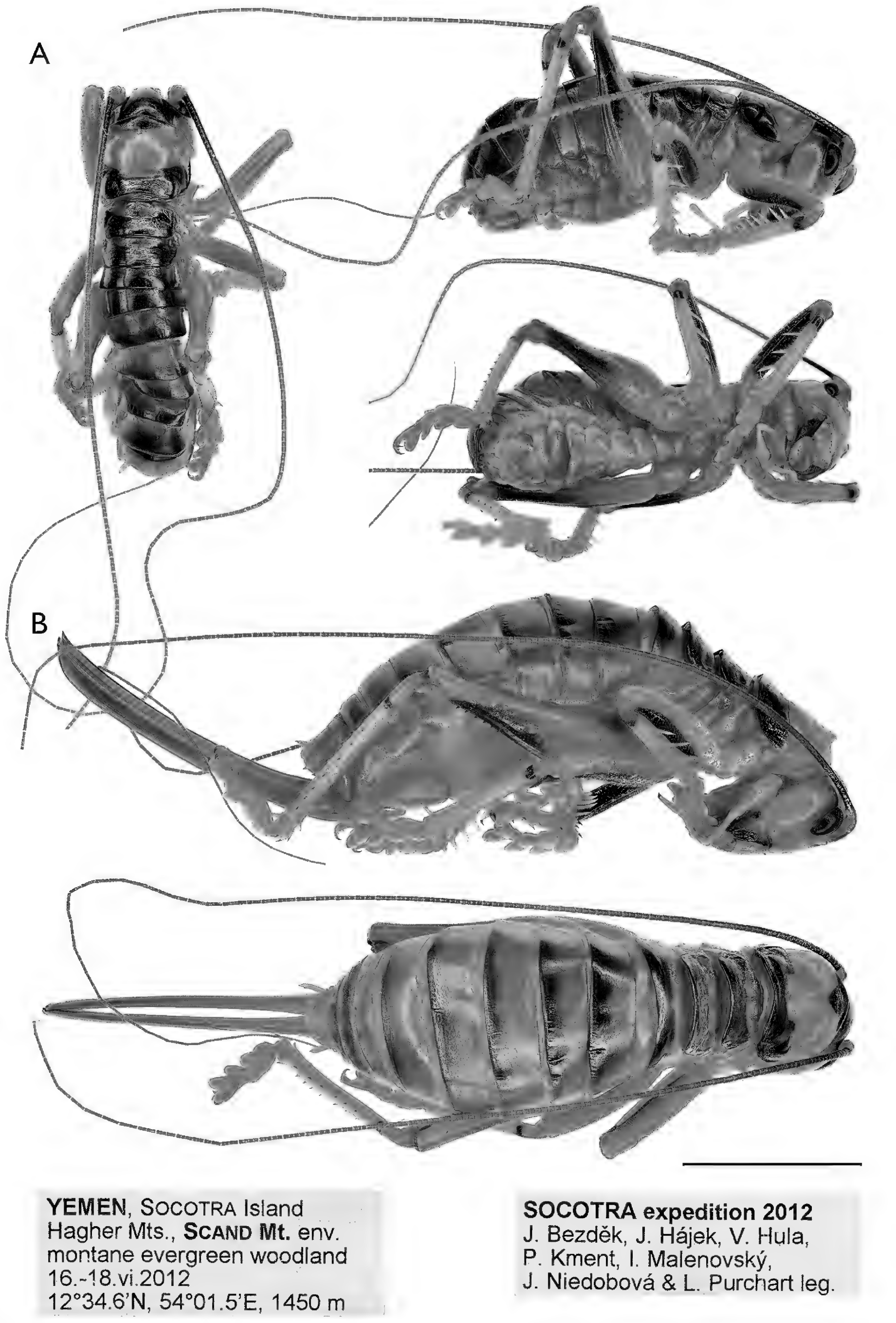

Figure 187. *Glomeremus capitatus* Uvarov, 1957, adult male and female. **A.** Male; **B.** Female. Skand, Socotra, 16–18 Jun 2012. Scale bar: 1 cm (photographs Yvonne van Dam and Rob Felix).

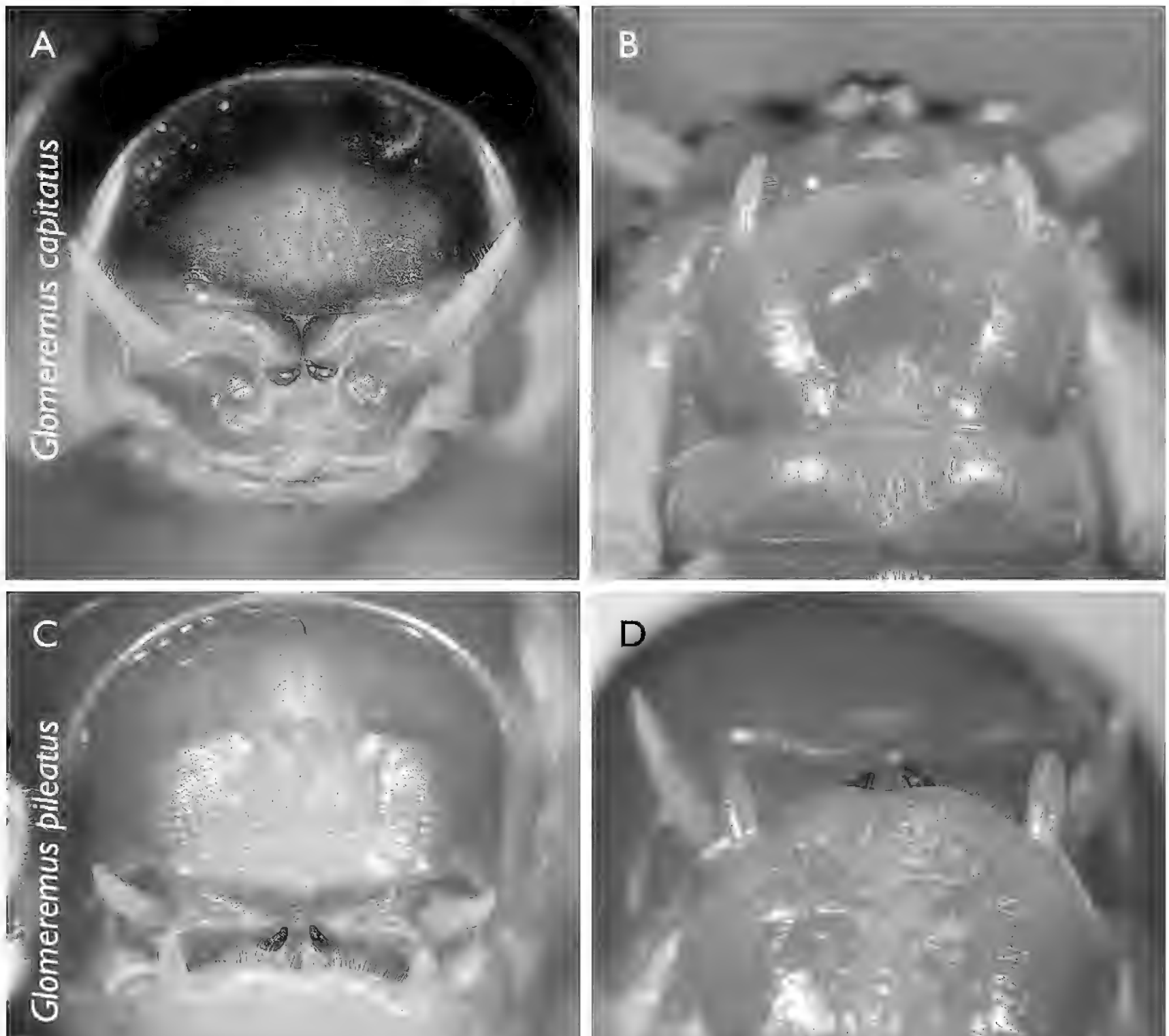

Figure 188. Terminalia of male *Glomeremus* spp. from Socotra. **A, B.** *G. capitatus* Uvarov, 1957; **C, D.** *G. pileatus* (Krauss, 1902); **E, F.** *Glomeremus mediopictus* Uvarov, 1957. **A, C, E.** Male tergite IX, hooks on the hind margin of tergite X, cerci, subgenital plate with styli; **B, D, F** Male subgenital plate with styli (photograph Rob Felix).

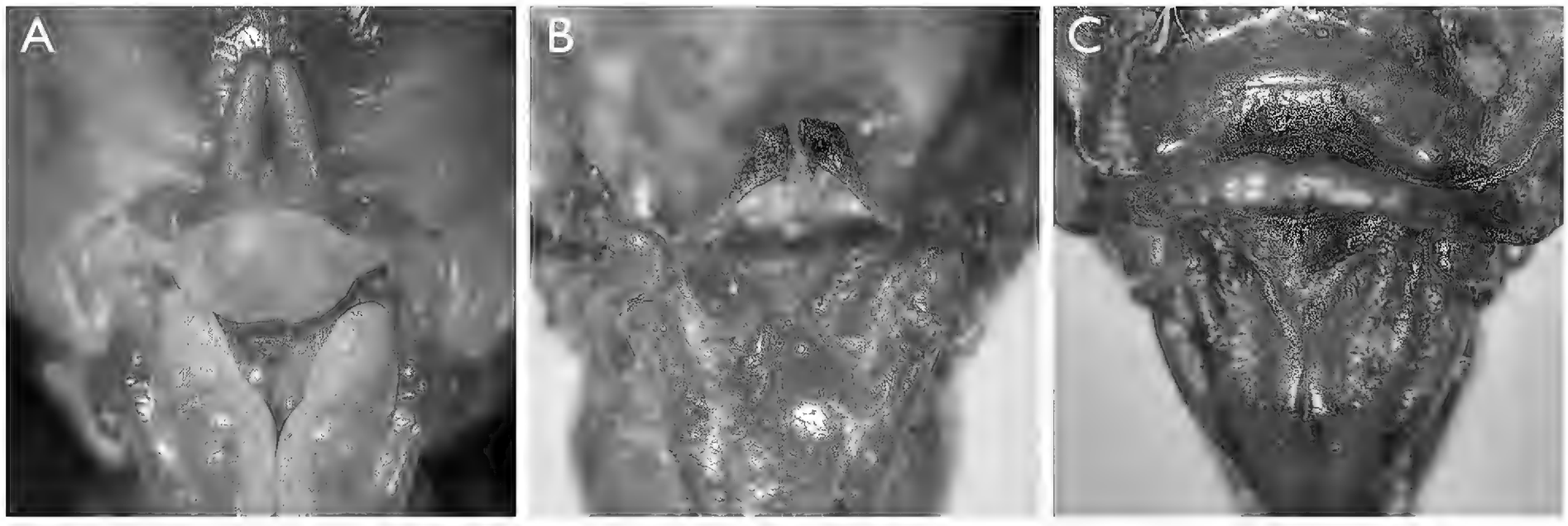

Figure 189. Subgenital plates of female *Glomeremus* spp. from Socotra. **A.** *G. capitatus* Uvarov, 1957; **B.** *G. pileatus* (Krauss, 1902); **C.** *Glomeremus mediopictus* Uvarov, 1957. The first two species show an anteflexed, bifid structure (**A, B**), while the last species shows a swollen transverse ridge (**C**) (photograph Rob Felix).

Diagnostic notes. Raspy Crickets (Gryllacrididae) are plump, non-jumping crickets with soft, fleshy bodies and nocturnal behaviour. They are often sandy-coloured (Fig. 185).

Glomeremus capitatus resembles *G. pileatus* in almost all aspects, including the male abdominal terminalia. The main characteristics of *G. capitatus* are the typical black pattern on the pronotum and more extensive black markings on the antennae, abdominal tergites and legs (Fig. 187), compared to *G. pileatus*. There are subtle differences in the genital plate in males of both species: rounded mainly with a slightly truncated apex in *G. capitatus* and trapezoid in *G. pileatus* (Fig. 188). In females, there is a clear difference in the subgenital plate. In *G. capitatus*, females have elongated lobes with a rounded apex. In *G. pileatus*, they are much shorter, square and sharply notched (Fig. 189).

The width of the head is not a good characteristic for separating both species, contrary to Uvarov (in Uvarov and Popov (1957)) and Popov (1984). In both species, the head is wider than the pronotum.

Uvarov (in Uvarov and Popov (1957)) and Popov (1984) state that, contrary to *G. pileatus*, *G. capitatus* does not have stridulatory pegs on the side of its tergites. However, an examination of the specimens *G. capitatus* collected at Skand and Zerig in 2012 shows the presence of those pegs on the second and third tergites, both in males, females and late instar nymphs.

Taxonomic notes. Uvarov (in Uvarov and Popov (1957)) based his concise species description of *Glomeremus capitatus* on a male collected at Dixam Plateau by Popov in 1953. We presume this holotype to be a late instar nymph, based on its size (18 mm), general colouration and the apparent absence of well-developed styli at the posterior margin of the subgenital plate, as judged from the depicted photographs (only cerci are present) (Fig. 186).

Czech entomologists collected an adult male and female specimen in 2012 (Fig. 187). The male body is much larger (25 mm) than the holotype's body and the degree of black markings on the abdomen and legs is much more extensive. The male has two well-developed styli on the hind margin of the subgenital plate (Fig. 188).

Here, we give a concise re-description of the male, with additional characteristics missing in the original species description (Uvarov in Uvarov and Popov (1957)) and a brief description of the female.

Re-description. Male: moderate size, body sandy-coloured with extensive black markings, shiny, eyes black. The posterior margins of the mesonotum, metanotum and abdominal segments are broadly marked black. The femora laterally and ventrally are extensively marked black and the tibiae, dorsally, have a black spot near their base. Lip sandy-coloured, jaws black, paler towards the base. The antennae are four times as long as the body, the two basal segments are sandy-coloured and from the third segment onwards, the antennae display a colour transition from blackish to dark brown and yellowish (Figs 185, 187). The posterior margin of the subgenital plate is essentially convex with a slightly truncated apex, ventrally with a depression in the centre (Fig. 188).

Female: same as male, except large size, much larger than male. Ovipositor elongate and rather thick, acuminate; the lower margin is almost straight and the upper slightly arched upwards (Fig. 187). The subgenital plate in the female is triangular, anteflexed and bifid at the apex, with elongated slender lobes (Fig. 189) — Body length male: 23 mm; female: 33 mm; ovipositor: 18 mm.

Both are based on only one specimen each, so we recommend a future examination of a small series of specimens.

Distribution and occurrence. Endemic to Socotra. Apparently, it is rare and local and confined to Dixam and the Hagher. Popov collected the holotype "between RAF camp and Muhullus". The map in Uvarov and Popov (1957) shows the route Popov travelled in 1953, between the RAF camp in the north and Mahalis in the south, crossing Dixam at a point around 3000 feet (914 m a.s.l.). We expect the collecting site to be near that site (Fig. 190). Other Orthoptera specimens collected that day by Popov bear the label "10 miles south of RAF Camp", which fits the above site description.

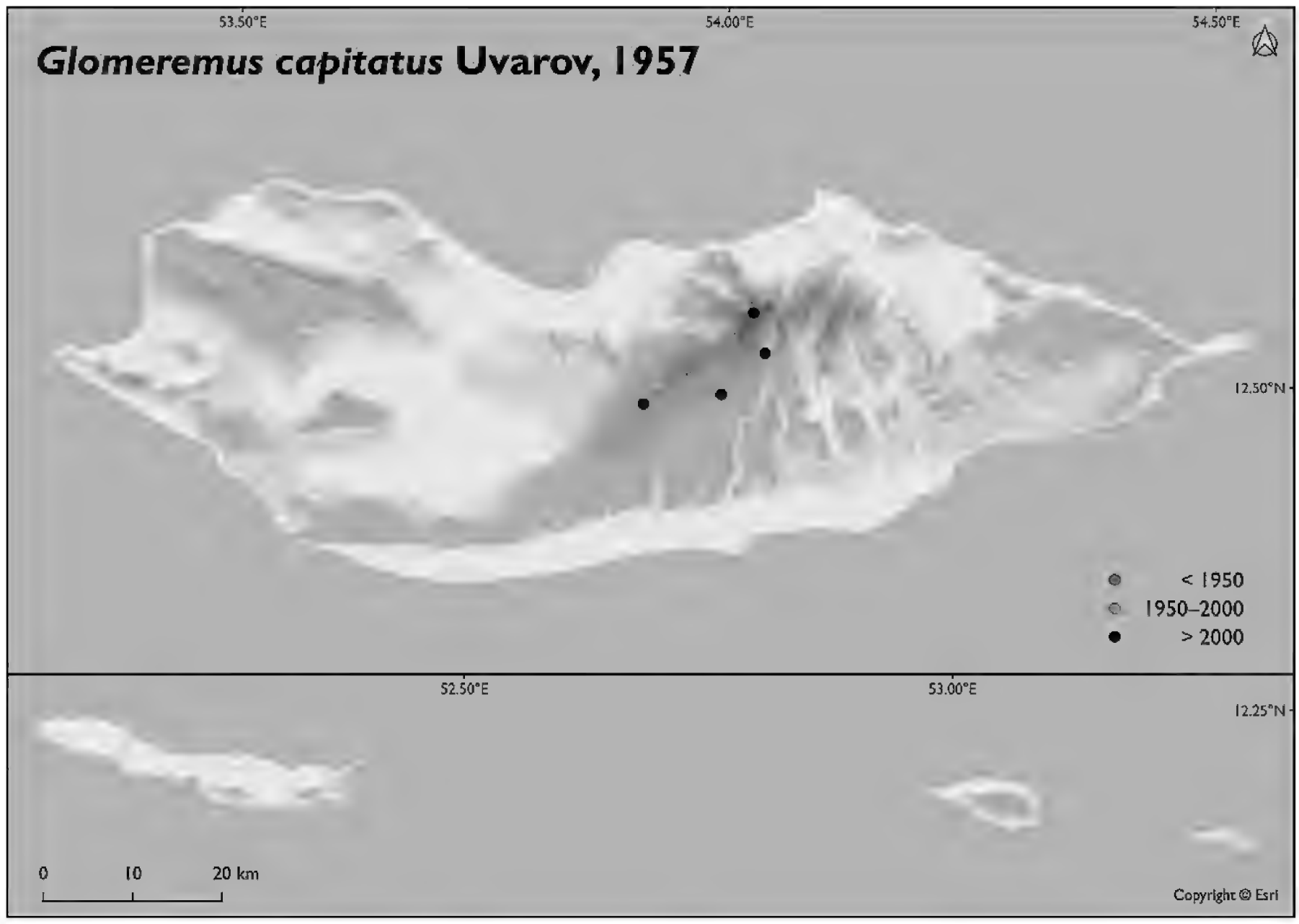

Figure 190. Distribution of *Glomeremus capitatus* Uvarov, 1957 in the Socotra Archipelago.

Habitat and biology. Only found in higher elevations (700–1450 m a.s.l.). The habitat at the type locality at Dixam is supposed to be submontane shrubland or *Dracaena* woodland. At Mount Skand, the Czechs collected the species in a montane forest. Where these specimens were collected is unknown: inside shrubs or on/under the ground. It is a nocturnal species like all Gryllacridids. The records are from March and June.

Bioacoustics. All gryllacridids produce sound by a femoral-abdominal stridulatory apparatus, formed by parallel rows of pegs on the lateral side of tergites and a row of pegs on the adjacent inner side of the hind femora. Sound producing is only used as a defence if the crickets are threatened. Tympana are absent in this cricket family (Rentz and John 1989).

Glomeremus pileatus (Krauss, 1902)

Figs 188, 189, 191–194

References for Socotra. Krauss 1902: 5 [as *Eremus pileatus*]; Krauss 1907: 17, 26, 30, plate II: figs 9, 9A–D [as *E. pileatus*]; Griffini 1914: 245 [as *Neanias pileatus*]; Uvarov (in Uvarov and Popov (1957)): 359, 361, figs 1–2; Popov 1984: 197–200, figs 71, 72, 78, 79; Wranik 1998: 173; Wranik 2003: 313, plates 145, 148; Massa 2009: 55, figs 1–6; Cadena-Castañeda 2019: 55, 84.

Diagnostic notes. *Glomeremus pileatus* (Krauss, 1902) is characterised by a typical pattern of two bands in the middle of the pronotum (Figs 191, 192, 194). This pattern is quite variable (Uvarov in Uvarov and Popov (1957); Massa 2009). In some specimens, the markings are pitch black; in others, they are rufous, as mentioned for the type specimen or even faded. The same applies to other body markings like legs or abdomen. A population that may belong to *G. pileatus* occurs in dunes near Arher, but features little to no dark pigmentation.

Contrary to what Popov (1984) stated in his key to the species of *Glomeremus* of Socotra, the stridulatory pegs are on the 2nd and 3rd tergites, not the 1st and 2nd. Furthermore, in *G. pileatus*, the head is also clearly wider than the pronotum, as depicted in, for example, figs 1–2 in Massa (2009). The width of the head is not a good character to separate the species from *G. capitatus*.

In comparing Popov's material with Krauss's description, Uvarov (in Uvarov and Popov (1957)) noticed that the ninth tergite in the male is not convex behind, but decidedly truncated. The same is true in our material (Fig. 188). For further characteristics, see *G. capitatus*.

Taxonomic notes. Krauss (1902, 1907) gives the following species description [translated from Latin]: "*Small, ochraceous, occiput and fastigium of the vertex covered with a black, shiny, subtriangular spot, like a cap. The fastigium of the vertex is scarcely wider than the first antenna segment. Smooth forehead, shiny. Lip rufous, jaws black, paler towards the base. Antennae half as long as the body [probably broken in the type specimen, since in specimens studied by us, they are more than twice*

Figure 191. *Glomeremus pileatus* (Krauss, 1902), female. Ditwah, Socotra, 8 Feb 2024 (photograph James Bailey).

as long as the body], rusty, the two basal joints are ochreous, the third joint is black brown. Pronotum short, with rounded corners. A large central transverse rusty spot ornaments the centre of the pronotum; sometimes decorated with some black spots on the lateral side of the rusty spot. Mesonotum on the anterior margin, metanotum on the posterior margin marked by two chestnut spots. Femora rusty-coloured, underside with a black semi-lunar spot in front of the apex, underside hind femora with black spines, 2–5 on the inner margin, 1–5 on the outer margin. Tibiae dorsally with a black spot near their base. Abdominal tergites with black posterior marginal bands. Ninth abdominal tergite in male semi-lunar, convex, posteriorly arched. Subanal valves expanded transversely on the inner margin armed with black, hooked spinules. Subgenital plate in male semi-lunar, posteriorly arched, equipped with a stylus on both sides; in female, triangular, anteflexed, bifid at the apex, with obtuse lobes. Ovipositor rusty, slender, elongate, acuminate, the lower margin almost straight, the upper broadly arched, the apex suddenly ascending, almost hooked. Body length male 16 mm, female 22–27 mm, ovipositor 10 mm" (Fig. 192).

We suspect the male type was a nymph, based on the small size of the male (16 mm) mentioned in the species description (Krauss 1902; 1907). Some of the specimens we studied are much larger (26 mm).

The type specimens, one male and two females collected at Shuab, have been lost, as stated by Uvarov (in Uvarov and Popov (1957)) and confirmed by the museum in Vienna (H. Bruckner in litt.). *G. pileatus* deserves the designation of an adult male neotype, preferably from the western part of Socotra. At the same time, a female should be collected, preferably during mating. Both should be re-described. Since the possible existence of one or several (cryptic) species besides *G. pileatus*, this will prevent later confusion.

Distribution and occurrence. Endemic to Socotra. Relatively widespread and not as rare as mentioned by Uvarov (in Uvarov and Popov (1957)) and Wranik (2003) (Fig. 193). *Glomeremus* spp. are called Brothers of the Goats in Socotri (Wranik 2003), suggesting a relatively common appearance on the island.

Habitat and biology. Nocturnal. In 2009 and 2010, they were found in various habitats, during the day under stones and at night in shrubs, like *Croton socotranus* and *Jatropha unicostata* (Fig. 194). *G. pileatus* occurs in all vegetation types, except montane forests and shrubland in the high Hagher. They are recorded nearly year-round at elevations from 5–350 m a.s.l.

Bioacoustics. See *G. capitatus*.

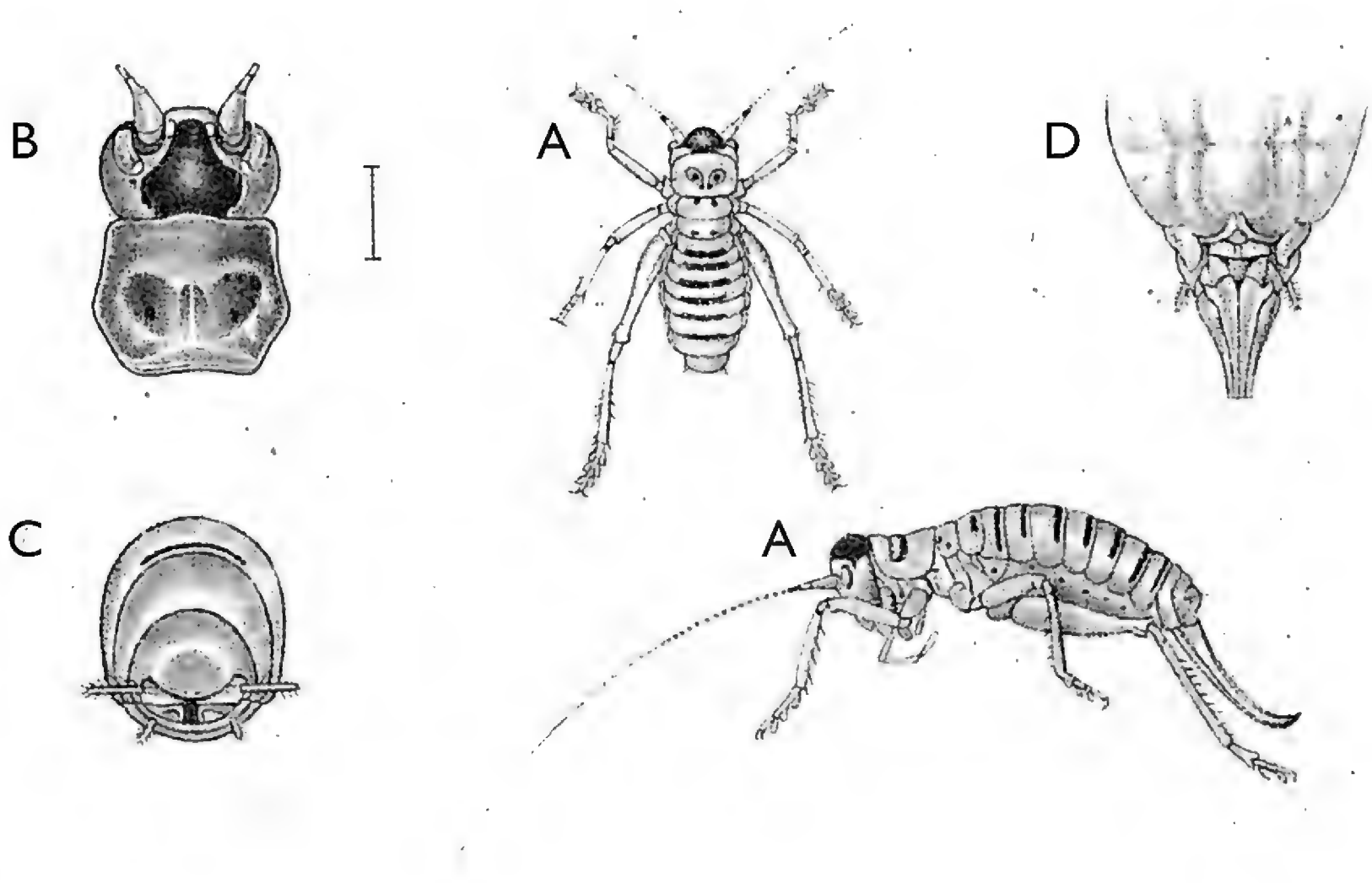

Figure 192. Illustrations of *Glomeremus pileatus* (Krauss, 1902) accompanying the species description. **A.** Habitus; **B.** Dorsal view of head and pronotum; **C.** Abdominal terminalia of the male; **D.** Ventral view of abdominal terminalia of the female (Krauss 1907).

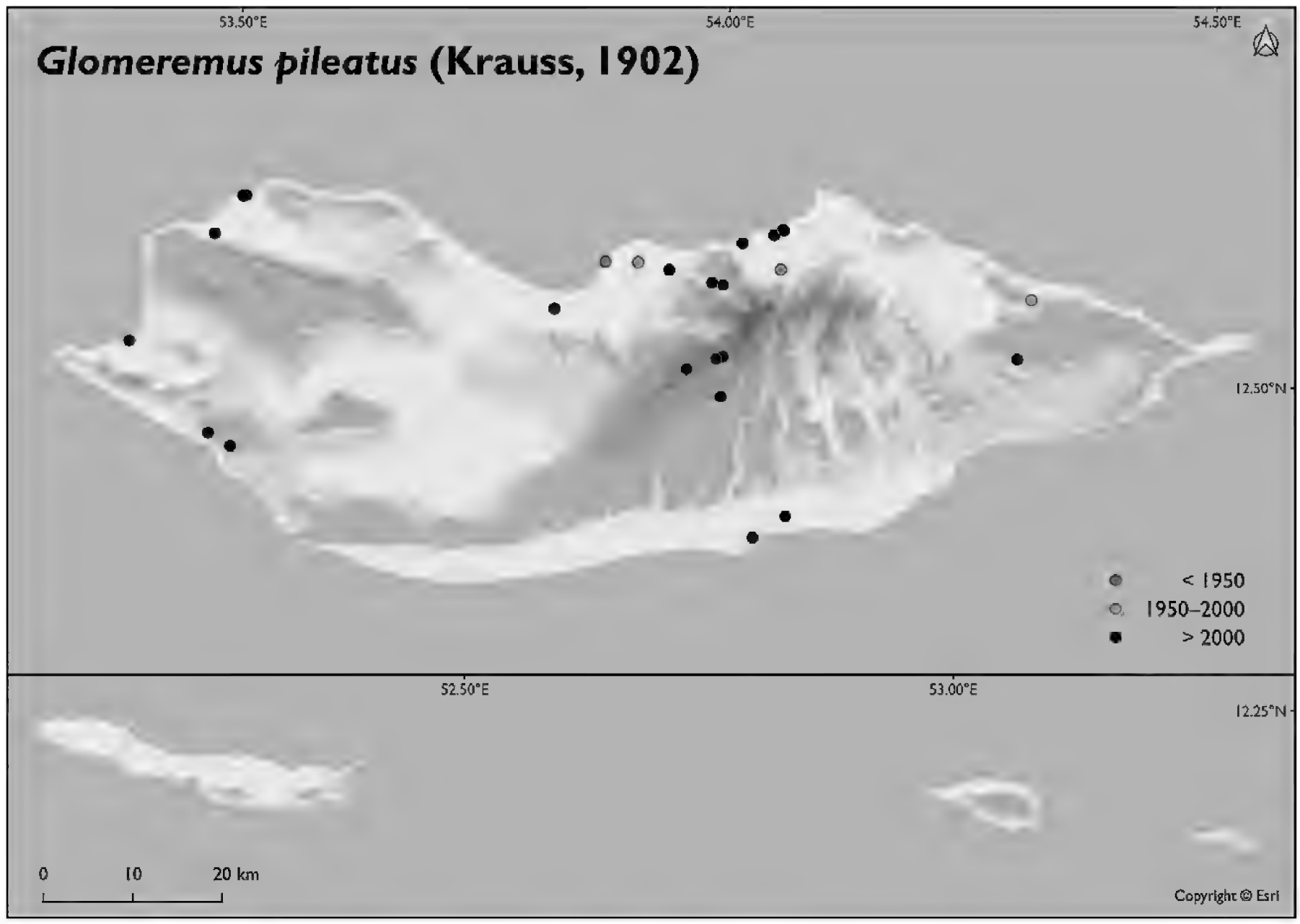

Figure 193. Distribution of *Glomeremus pileatus* in the Socotra Archipelago.

Figure 194. *Glomeremus pileatus* (Krauss, 1902), copulating pair. Ditwah, Socotra, 28 Feb 2009 (photograph Rob Felix).

Glomeremus mediopictus Uvarov, 1957

Figs 188, 189, 195–198

References for Socotra. Uvarov (in Uvarov and Popov (1957)): 362, figs 4, 5; Popov 1984: 197–200, figs 74, 75, 76, 80–84; Wranik 2003: 313, plate 148; Massa 2009: 55, fig. 7; Cadena-Castañeda 2019: 55, 84.

Diagnostic notes. *Glomeremus mediopictus* differs markedly from *G. capitatus* and *G. pileatus*. It is much smaller, has tiny scale-like wings, has a much more delicate appearance and has different black markings on the body and legs (Uvarov in Uvarov and Popov (1957)) (Fig. 196). The most important difference with the other two species is the terminalia of males and females. In males of *G. capitatus* and *G. pileatus*, the hooks on the posterior margin of the 10th tergite are directed backwards and slightly upwards. Conversely, in *G. mediopictus*, these hooks point downwards and inwards (Fig. 188). In female *G. mediopictus*, the subgenital plate has a transverse crescentic swelling in the middle, whereas *G. capitatus* and *G. pileatus* have an anteflexed, bifid structure (Fig. 189).

Distribution and occurrence. The species is endemic to Socotra. Only a few records are known, scattered over the island (Fig. 197), but the species is probably overlooked. Uvarov (in Uvarov and Popov (1957)) mentioned that the collection site of the holotype is at 3000 ft [914 m a.s.l.]; Popov (1984) noted 100 m a.s.l. (300 ft) as elevation, as also stated on the label. We consider the latter to be correct (see Discussion).

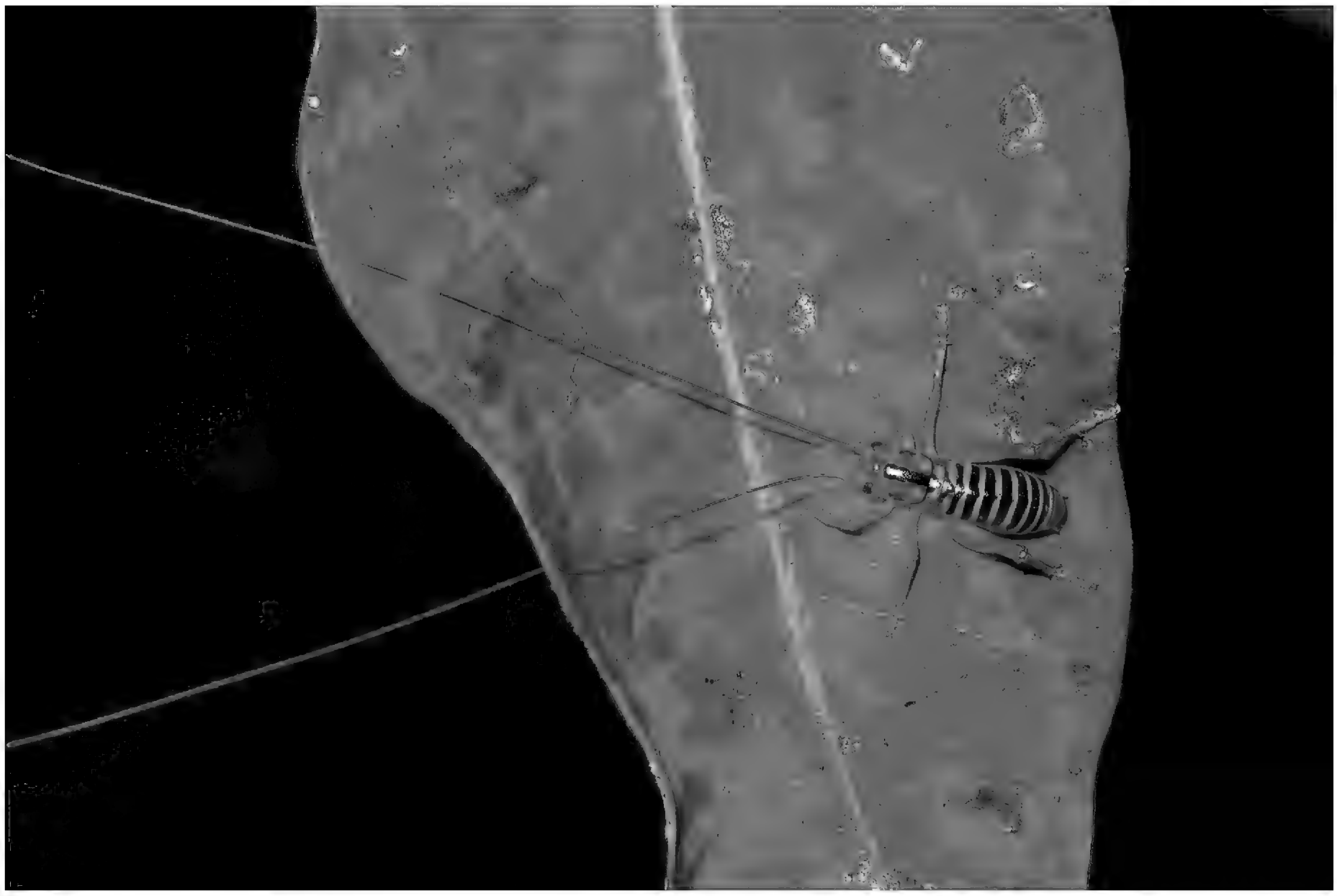

Figure 195. *Glomeremus mediopictus* Uvarov, 1957, male in its nocturnal habitat. Begobig, Momi, Socotra, 24 Feb 2009. On *Jatropha unicostata* (photograph Rob Felix).

Figure 196. *Glomeremus mediopictus* Uvarov, 1957, male, holotype. Collected by George Popov in Wadi Dineghen in 1953. Scale bar: 1 cm (photograph Rob Felix).

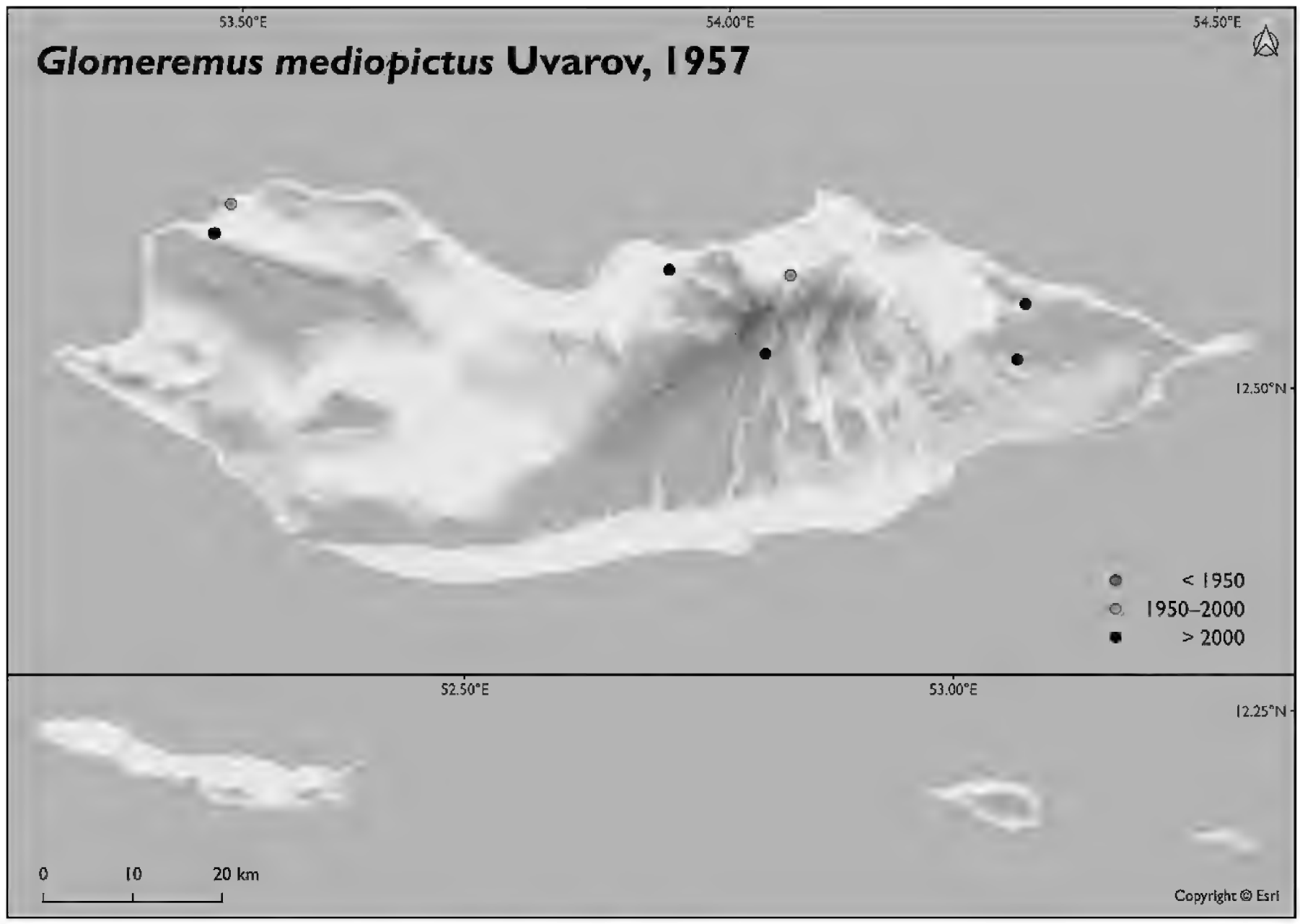

Figure 197. Distribution of *Glomeremus mediopictus* Uvarov, 1957 in the Socotra Archipelago.

Figure 198. *Glomeremus mediopictus* Uvarov, 1957, mating pair. Qeysoh, Socotra, 28 Feb 2009. In *Senna socotrana* (Serrato) Lock (photograph Rob Felix).

Habitat and biology. All records are from high scrubland with succulents. The species occurs at low elevations from 10–350 m a.s.l. In 2009, it was found at night in various shrubs, like *Senna socotrana*, *Jatropha unicostata* and *Cissus subaphylla* (Fig. 198). Massa (2009) collected the species in *Croton socotranus*. It is possibly associated with more humid localities than *G. pileatus*. Records are from February to April.

Bioacoustics. See *G. capitatus*.

Tettigonioidea
Tettigoniidae
Conocephalinae
Conocephalini

Conocephalus maculatus (Le Guillou, 1884)

Figs 199–202

References for Socotra. Uvarov (in Uvarov and Popov (1957)): 363–364, figs 8, 9 [as *Conocephalus bidens*]; Popov 1981: 127; Wranik 2003: 314, plate 148.

Diagnostic notes. Amongst the bush-cricket species on Socotra, *C. maculatus* is recognisable as a typical smaller conehead: a slender, grass-green bush-cricket with long wings, a body length including wings around 26 mm, a pointed head in lateral view and the presence of a dark band extending from the frons to the hind margin of the pronotum (Fig. 199). Each male cercus is armed

with one inner tooth (Fig. 200). It is the only member of *Conocephalus* on the Archipelago.

Taxonomic notes. Uvarov (1952) described *Conocephalus bidens* Uvarov 1952 as an endemic species to Socotra, based on a single male. After examination of the type specimen and specimens collected afterwards by Guichard, Popov (1981) concluded that the type has a deformed spine on the cercus. Since all other material collected on Socotra is identical to *Conocephalus maculatus*, he considered *C. bidens* a junior synonym.

Distribution and occurrence. The species is widespread in Africa and Asia. On Socotra, it is widespread, but only locally common. It also occurs in the Hagher, on the limestone plateaus and near Qalansiyah (Fig. 201).

Habitat and biology. *C. maculatus* occurs in well-vegetated grassy sites, especially near water, for example, in wadis and along springs and lagoons, from 0–1000 m a.s.l. They have also been observed near lowland settlements with adequate weed and grass cover in wetter months (Fig. 202). Adults are fully winged and may visit lights at night in Hadiboh and other areas. Records are from all months.

Bioacoustics. The song of *C. maculatus* consists of high-pitched rustling echemes of 400 ms–2 s, based upon recordings from UAE (Paolo Fontana in litt.), Mozambique (Naskrecki and Guta 2019) and Tanzania (Hemp 2021).

Figure 199. *Conocephalus maculatus* (Le Guillou, 1884), male. Wadi Darho, Socotra, 1 Feb 2024 (photograph James Bailey).

Figure 200. *Conocephalus maculatus* (Le Guillou, 1884), male cerci (photograph James Bailey).

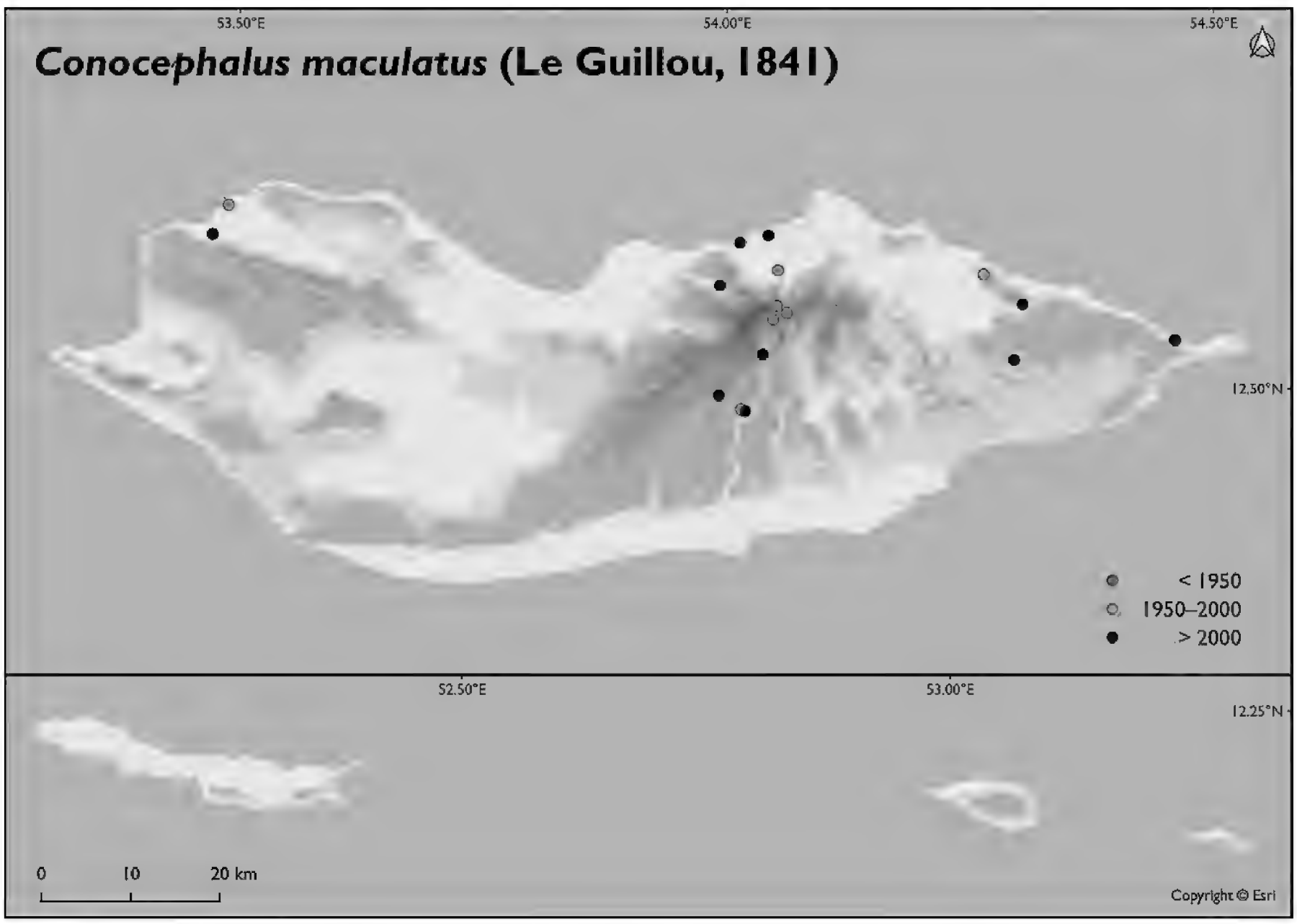

Figure 201. Distribution of *Conocephalus maculatus* (Le Guillou, 1884) in the Socotra Archipelago.

Figure 202. Habitat of *Conocephalus maculatus* (Le Guillou, 1884) on Socotra. Begobig, Momi, Socotra. Well-developed grassy vegetation can only survive on Socotra behind fences to protect it from grazing goats (photograph Rob Felix).

Copiphorini

Ruspolia aff. *R. basiguttata* (Bolívar, 1906)

Figs 203–207

References for Socotra. Uvarov (in Uvarov and Popov (1957)): 364 [*Homorocoryphus nitidulus*]; Popov 1981: 128–130, figs 35–38; Wranik 2003: 314–315, plate 148.

Diagnostic notes. *Ruspolia* aff. *R. basiguttata* is a large conehead unlikely to be confused with any other bush-cricket in Socotra. Most members of the species-rich tribe Copiphorini are acoustically distinct, but morphologically very similar: medium-sized to large bush-crickets with a large, pointed head and long wings reaching far beyond the hind knees. *R.* aff. *R. basiguttata*

Figure 203. *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906), male. Adho Dimello, Socotra, 31 Jan 2024 (photograph James Bailey).

is the only large conehead species of the Archipelago. It occurs in both green and brown forms, similar to most species in the subfamily Conocephalinae.

Taxonomic notes. Popov and Bailey tentatively identified material from Yemen, Oman and Socotra as possibly belonging to *R. basiguttata*, using Bailey's key (1975) (Popov 1981) (Fig. 204). There are some marked differences, however, between *R. basiguttata* from Ghana and Cameroon and the Arabian and Socotran specimens: the latter have a smaller size, a higher number of teeth in the stridulatory file and a much weaker armature of the hind femur and knee (Popov 1981). The song resembles that of *R. differens* (Serville, 1838) (KG Heller, in litt.) (see Bioaccoustics). Further study is required to determine the specific status of the Socotran specimens.

The genus *Ruspolia* Schulthess, 1898 requires a complete revision, combining morphological, molecular and bioacoustic data (Naskrecki and Guta 2019).

Distribution and occurrence. *R. basiguttata* is only known from its type localities in Cameroon and Ghana (Naskrecki 2009). On Socotra, *Ruspolia* aff. *R. basiguttata* is restricted to the Hagher and Dixam Plateau (Fig. 205).

Habitat and biology. In 2010, some males sang from deep inside shrubs of *Searsia thyrsiflora* at Adho Dimello resulting in us being unable to catch them (Fig. 206).

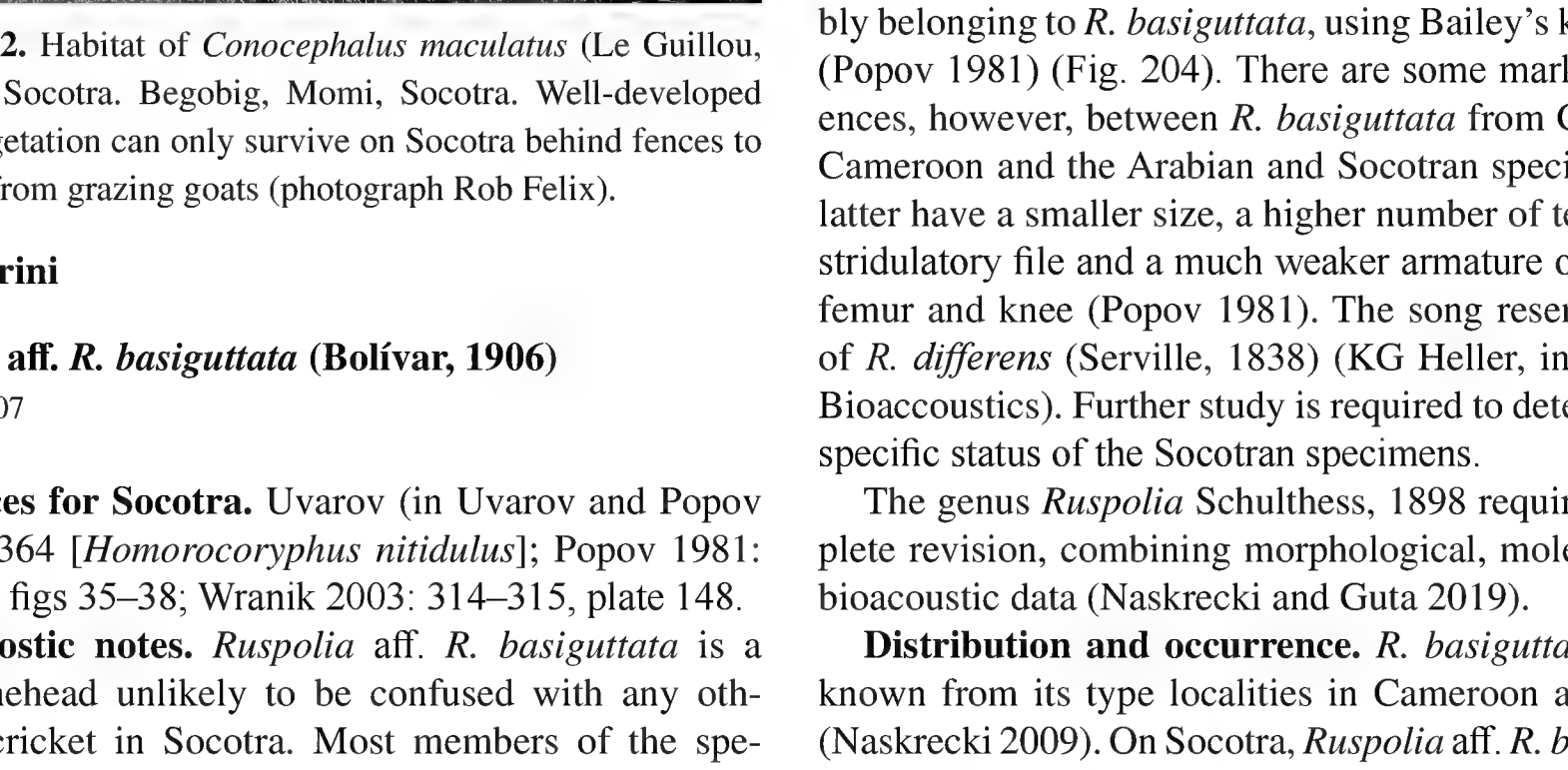

Figure 204. *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906), male. Adho Dimello, Socotra, Mar 1953. Scale bar: 1 cm (photograph Rob Felix).

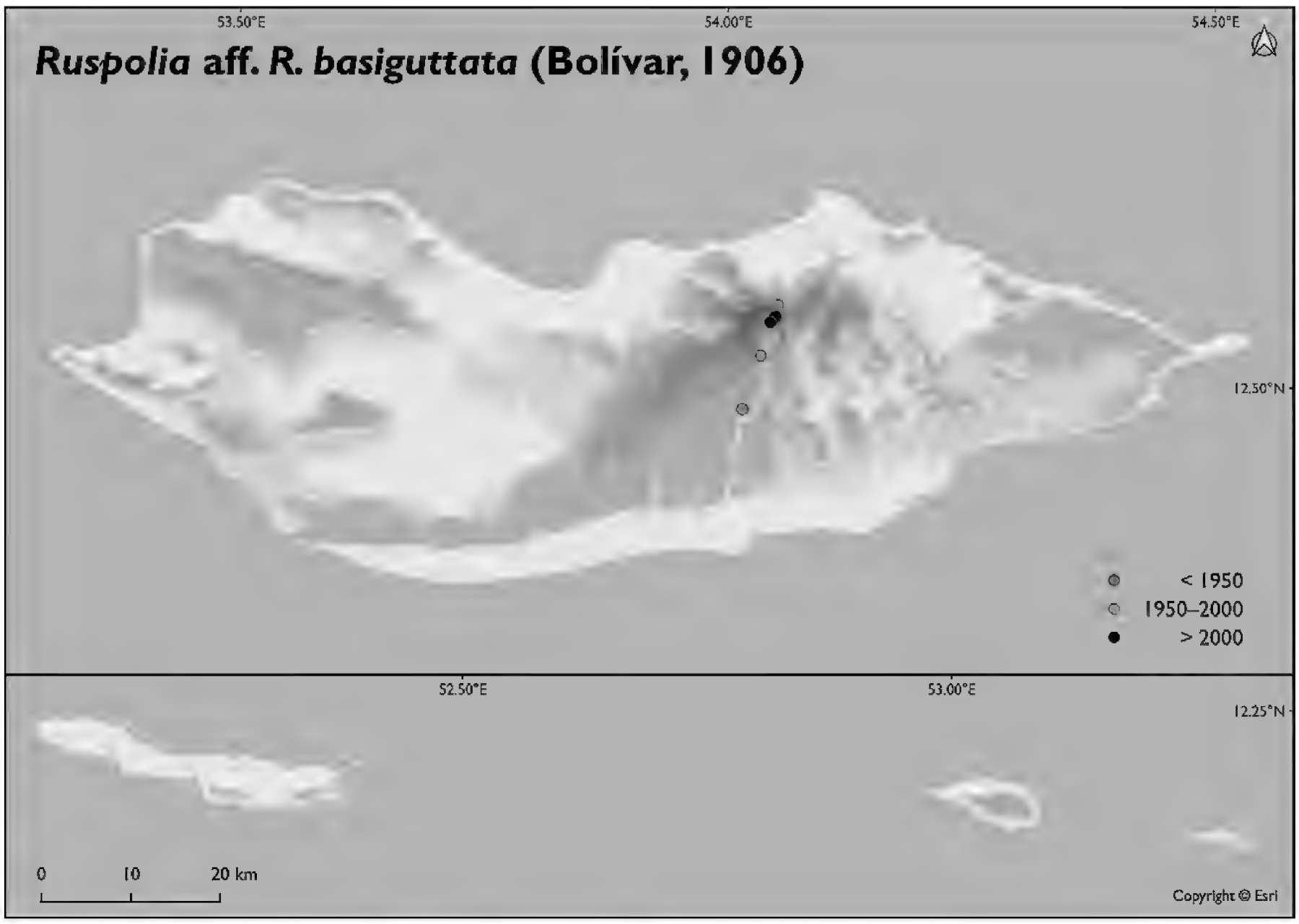

Figure 205. Distribution of *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906) in the Socotra Archipelago.

Figure 206. *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906), male. Adho Dimello, Socotra, 30 Oct 2010; RecRF10156 (photograph Robert Ketelaar).

The species occurs from 450–1000 m a.s.l. Older records are from Frankincense and *Dracaena* woodland and forests at lower elevations. Adults were recorded in January, March and October; nymphs in February and October.

Bioacoustics. The calling song of *Ruspolia* aff. *R. basiguttata* is a continuous echeme, sometimes mixed with very short silences (200 ms) (Fig. 207), typical for all African species of the genus (Bailey 1975). Echemes consist of equal syllables, repeated at 150 per second (SRR). The carrier frequency of the song is around 13–15 kHz and has no clear harmonics at higher frequencies. Close inspection of the spectrogram shows that the opening and closing movements of the wings produce different carrier frequencies. Based on the high syllable repetition rate (SRR) of nearly 150 Hz, the Socotran species could be related to *R. differens* (KG Heller, in litt.). *R. differens* has the highest SRR of the African species of 120–160 Hz and a peak frequency between 13 and 17 kHz (Bailey 1975). Heller (2019) recorded an SRR of 189 Hz and a peak at 14 kHz during a high nightly temperature of about 28 °C. Temperatures at Adho Dimello were not noted, but certainly much lower at the time of the sound recording in 2010 (Fig. 207). Hence, a much lower SRR is expected under such circumstances.

Mecopodinae

Pachysmopoda abbreviata (Taschenberg, 1883)

Figs 208–211

References for Socotra. Taschenberg 1883: 184–185 [as *Mecopoda abbreviata*]; Karsch 1886: 108, 109, 114–115, plate IV, fig. 2 [as *Mecopoda* (*Pachysmopoda*) *abbreviata*]; Burr 1903: 412, 421–422; Krauss 1907: 17, 25–26, 29, plate II: figs 8, 8[a]; Uvarov (in Uvarov and Popov (1957)): 362–363; Popov 1981: 120, plate 3; Wranik 1998: 158, 161, 171; Wranik 2003: 314, plates 145, 148.

Diagnostic notes. The size, appearance and loud song make *Pachysmopoda abbreviata* an unmistakable

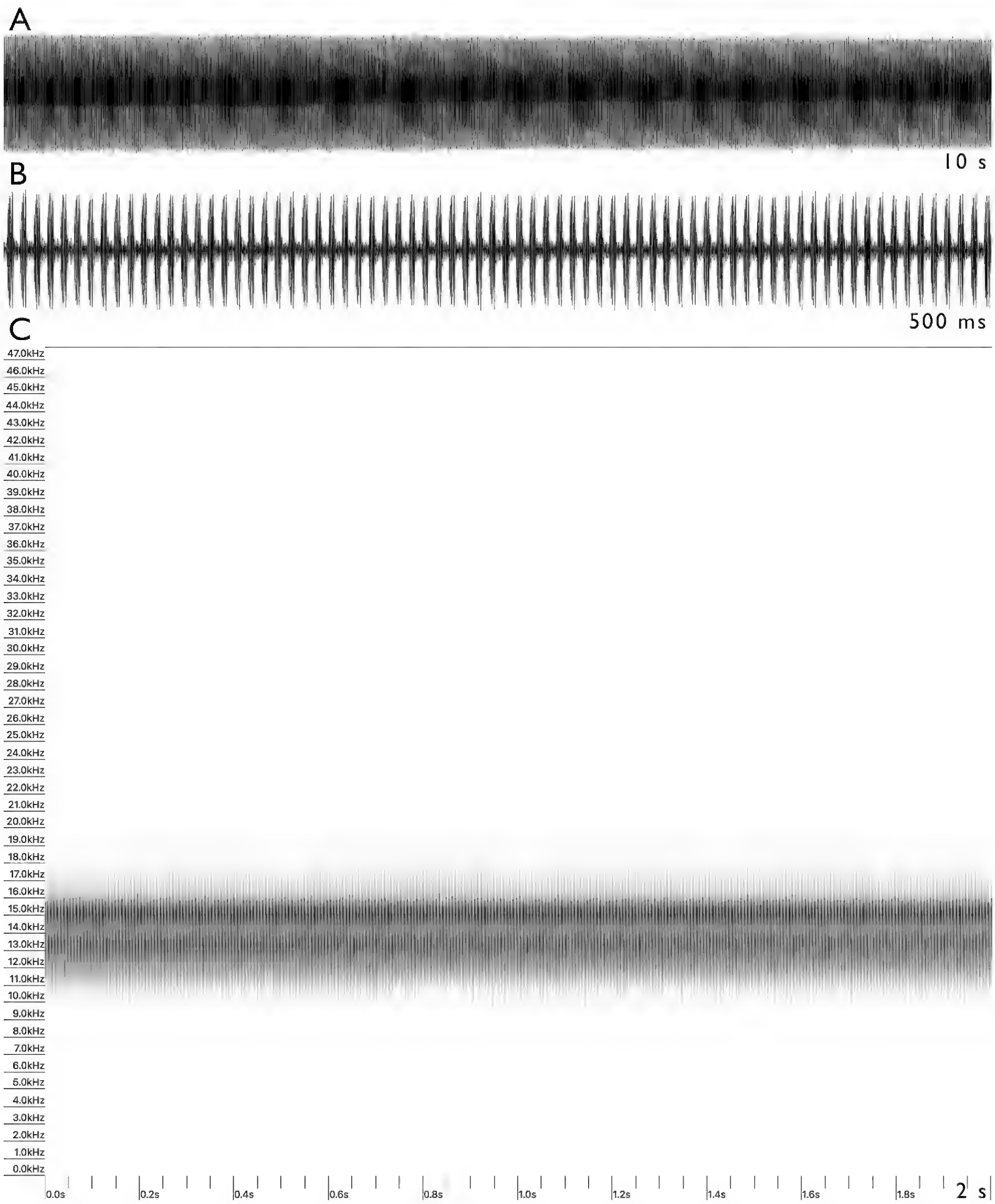

Figure 207. Calling song of *Ruspolia* aff. *R. basiguttata* (Bolívar, 1906). Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Adho Dimello, Socotra, 30 Oct 2010, 18:59 h; RecRF10156.

bush-cricket (Fig. 208). It is the largest bush-cricket on Socotra, characterised by a reddish-brown or green colour, a sturdy and robust body, broadly rounded and heavily-veined tegmina dotted with little cream spots and larger black ones, the latter as an extension of a black line starting at the anterior edge of the pronotum below the lateral carinae. Hind knees are also black.

Distribution and occurrence. It is a widespread endemic to Socotra (Fig. 210), locally common in well-vegetated habitats, for example, Wadi Ayhaft, but also occurring in more open vegetation.

Habitat and biology. *P. abbreviata* occurs in various vegetated habitats from 10–1470 m a.s.l. It is primarily nocturnal, hiding under stones during the day (Krauss

Figure 208. *Pachysmopoda abbreviata* (Taschenberg, 1883), male. Shilhin, Socotra, 11 Feb 2024 (photograph James Bailey).

Figure 209. *Pachysmopoda abbreviata* (Taschenberg, 1883), female, nymph. Wadi Dineghen, Socotra, 1 Nov 2010 (photograph Robert Ketelaar).

1907). In Feb 2009, we found it singing at night at Wadi Ayhaft from various herbs, shrubs and trees, like *Senna socotrana*, *Buxus hildebrandtii* and *Jatropha unicostata* (Fig. 212). Field observations indicated that a recording of the song played can sometimes trigger song responses from nearby males.

Records of both adults and nymphs (Fig. 209) are from all months. Most records of nymphs are from the last quarter of the year. The only adults on the 2010 trip were present in October at Adho Dimello. That year, we found no adults at other sites like Wadi Ayhaft, where they were numerous in February 2009.

In 2009, an elytron was found under a stone at Dixam, next to the skin of *Monocentropus balfouri* Pocock, 1897, suggesting *Pachysmopoda* is preyed upon by this spider.

Bioacoustics. The loud, far-carrying calling song of *Pachysmopoda abbreviata* is an echeme, repeated irregularly, lasting 600–1200 ms (Fig. 211A). Echemes consist of 15–27 syllables of equal duration, repeated at about 23 per second. The first few syllables are quieter than the following ones (Fig. 211B). The main frequencies of the song are between 9.5 and 21 kHz (Fig. 211C) (XC877963, accessible at https://www.xeno-canto.org/877963).

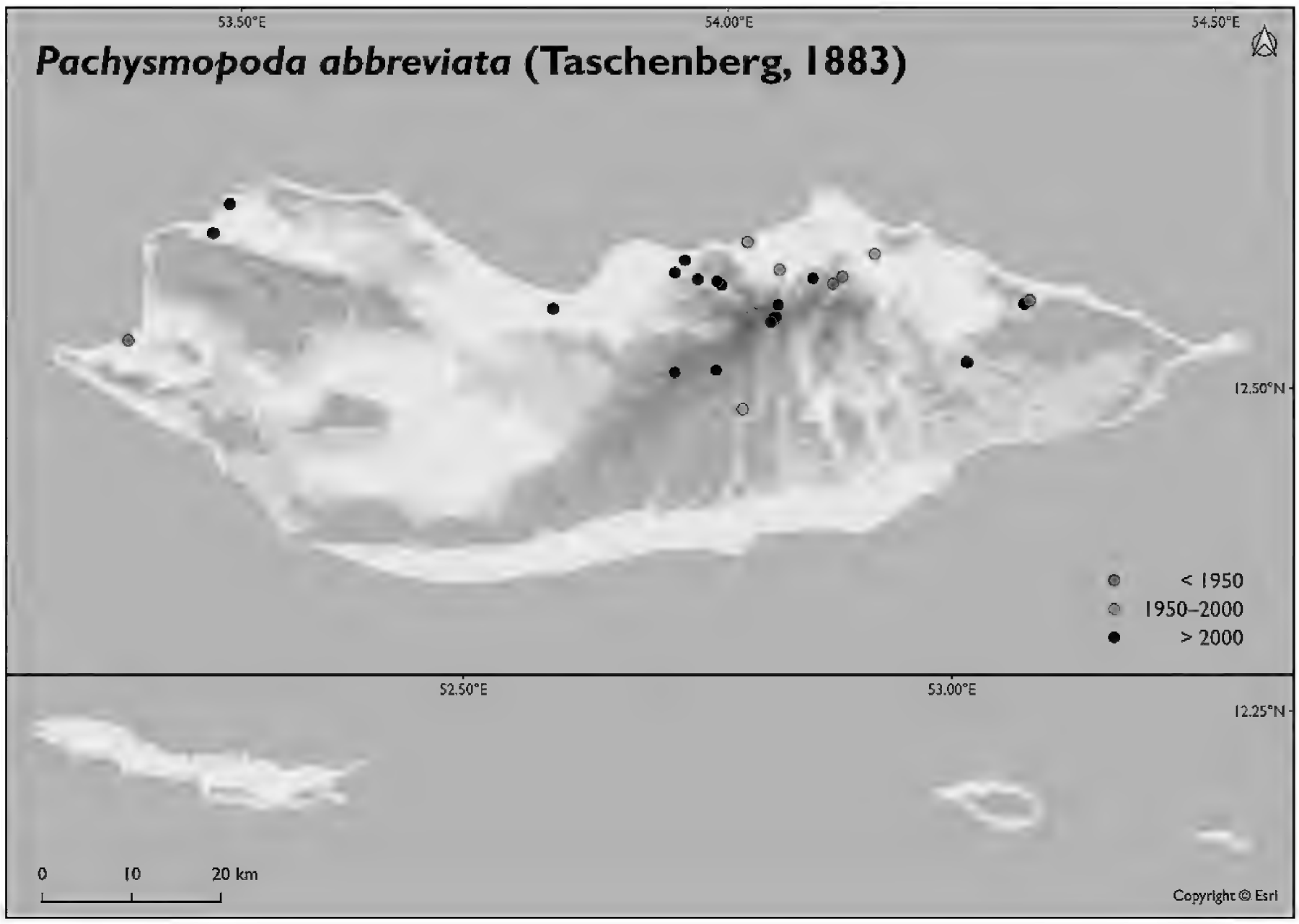

Figure 210. Distribution of *Pachysmopoda abbreviata* (Taschenberg, 1883) in the Socotra Archipelago.

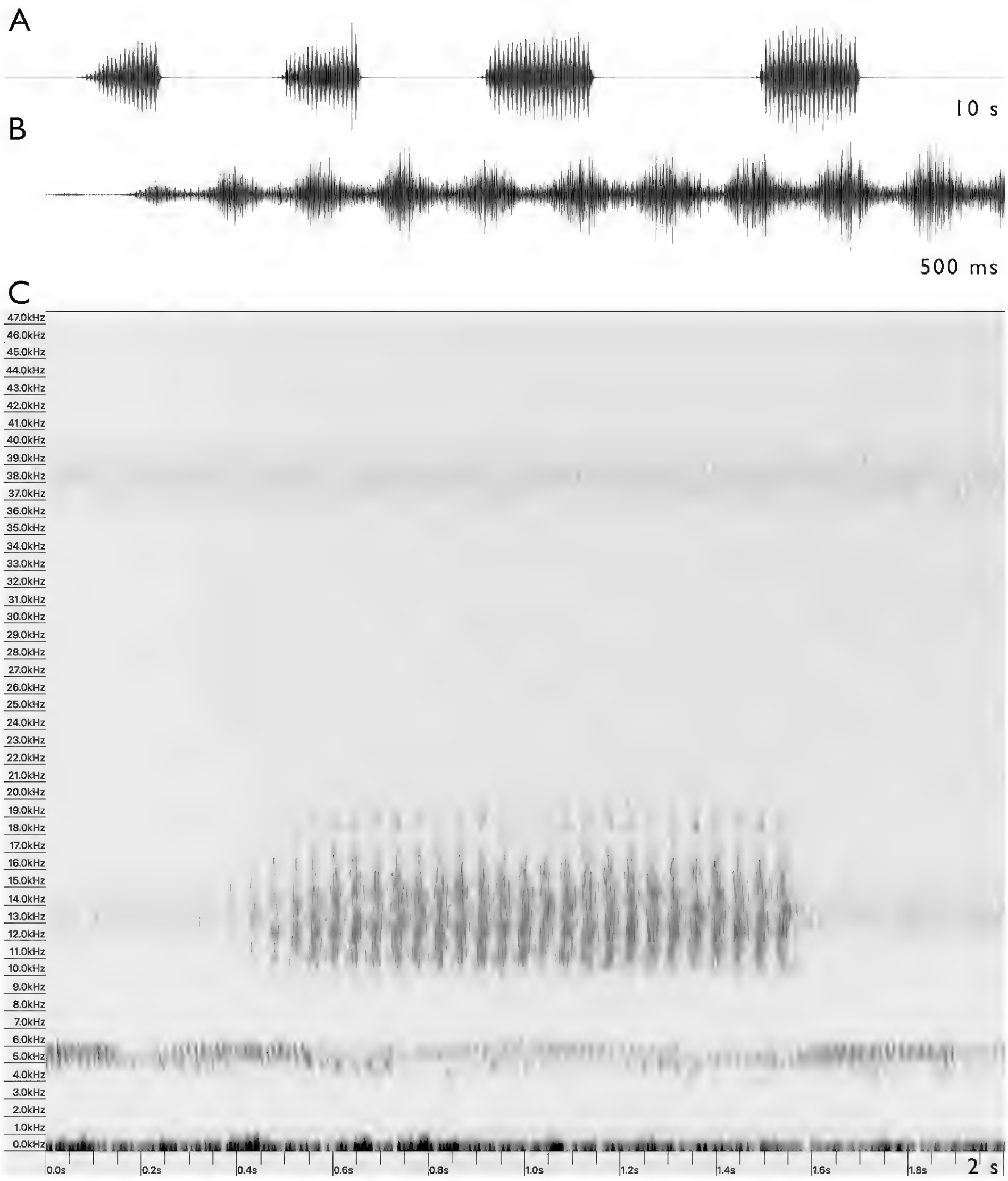

Figure 211. Calling song of *Pachysmopoda abbreviata* (Taschenberg, 1883). Oscillograms (**A, B**) and spectrogram (**C**) depicting 10 s (**A**), 500 ms (**B**) and 2 s (**C**). Adho Dimello, Socotra, 31 Oct 2010, 18:44 h; RecRF10149; XC877963, accessible at https://www.xeno-canto.org/877963.

Phaneropterinae

Phaneroptera sparsa Stål, 1857

Figs 213–215

References for Socotra. Taschenberg 1883: 184 [*Phaneroptera* sp.]; Burr 1903: 412, 421 [as *Phaneroptera nana*]; Krauss 1907: 29 [as *Phaneroptera* sp.]; Ragge 1956: 226, 236–237 [as *Phaneroptera nana sparsa*]; Uvarov (in Uvarov and Popov (1957)): 363 [as *Phaneroptera nana*]; Popov 1981: 134–135; Wranik 1998: 171 [as *Phaneroptera nana*]; Wranik 2003: 315, plates 146, 148; Massa 2021: 126 [as *Phaneroptera* aff. *P. cleomis*].

Diagnostic notes. Bush-crickets in the genus *Phaneroptera* are generic green, elegant species with long legs and tegmina surpassing the hind knees (Fig. 213).

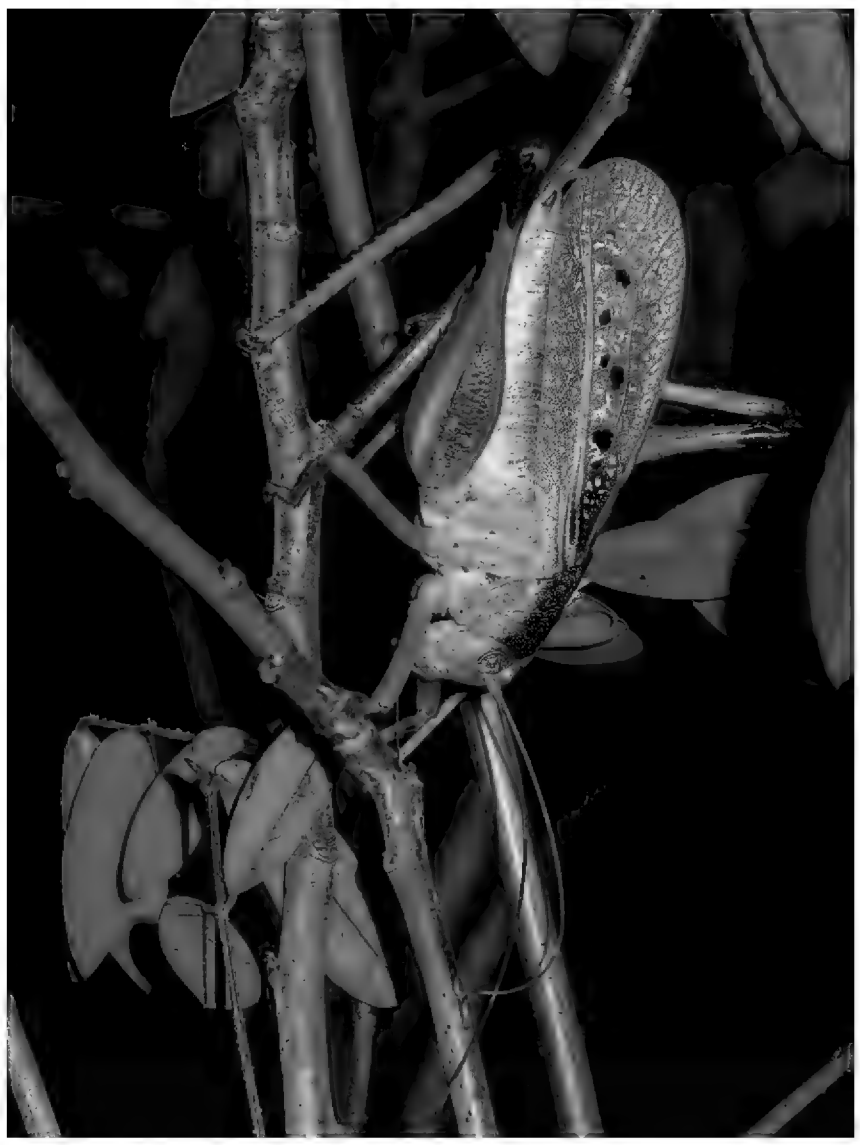

Figure 212. *Pachysmopoda abbreviata* (Taschenberg, 1883), male in singing position. In *Senna socotrana*, Wadi Ayhaft, Socotra, 22 Feb 2009 (photograph Rob Felix).

Figure 213. *Phaneroptera sparsa* Stål, 1857, female. Ditwah, Socotra, 8 Feb 2024 (photograph James Bailey).

Phaneroptera sparsa is the only member of the genus known to occur in the Archipelago. It differs from the only other Socotran member of Phaneropterinae, the endemic *Phaneroptila insularis* Uvarov, 1957, by its long hind wings extending beyond the tegmina and the shape of its pronotum and cerci. Beyond Socotra, *P. sparsa* can be separated from other members of the genus by its cerci, song and stridulatory file (Fig. 214).

Taxonomic notes. Popov (1981) mentioned five species of *Phaneroptera* occurring in Arabia and the Middle East: *P. albida* Walker, 1869, *P. cleomis* Ayal, Broza & Pener, 1974, *P. gracilis* Burmeister, 1838, *P. minima* Brunner von Wattenwyl, 1878 and *P. sparsa*. He identified his specimens from Socotra as *P. sparsa*. Massa (2021) tentatively identified his specimens from Socotra, UAE and Oman as *Phaneroptera* aff. *P. cleomis*. New insights, based on comparing the subgenital plate and stridulatory file (Fig. 214) with those of African specimens, reveal that Socotran *Phaneroptera* specimens belong to *P. sparsa* (B. Massa, in litt.).

Distribution and occurrence. *Phaneroptera sparsa* occurs in most of Africa south of the Sahara, Madagascar and Socotra, extending northwest to Morocco and the Canary Islands and in the northeast to Arabia and eastern Turkey (Ragge 1980; Popov 1981). On Socotra, the species is widespread, occurring from sea level at Hadiboh, up into the Hagher and on the surrounding limestone plateaus. It is also present in the western mountains (Fig. 215).

Habitat and biology. Records are mainly from high shrubland, Frankincense woodland and forest, *Dracaena* woodlands and montane mosaic and forests. Uvarov (in Uvarov and Popov (1957)) mentioned tall grasses on the slopes of the Hagher as its primary habitat. In 2010, we found the species in various shrubs (Fig. 213). On Socotra, the species occurs from 15–1200 m a.s.l. and records are from all months. *Phaneroptera* is attracted to light.

Bioacoustics. The song of this species is well-known and consists of short, high-pitched clicks (Hemp 2021; XC786755, accessible at https://www.xeno-canto.org/786755). There is no information on the bioacoustics of this species on Socotra.

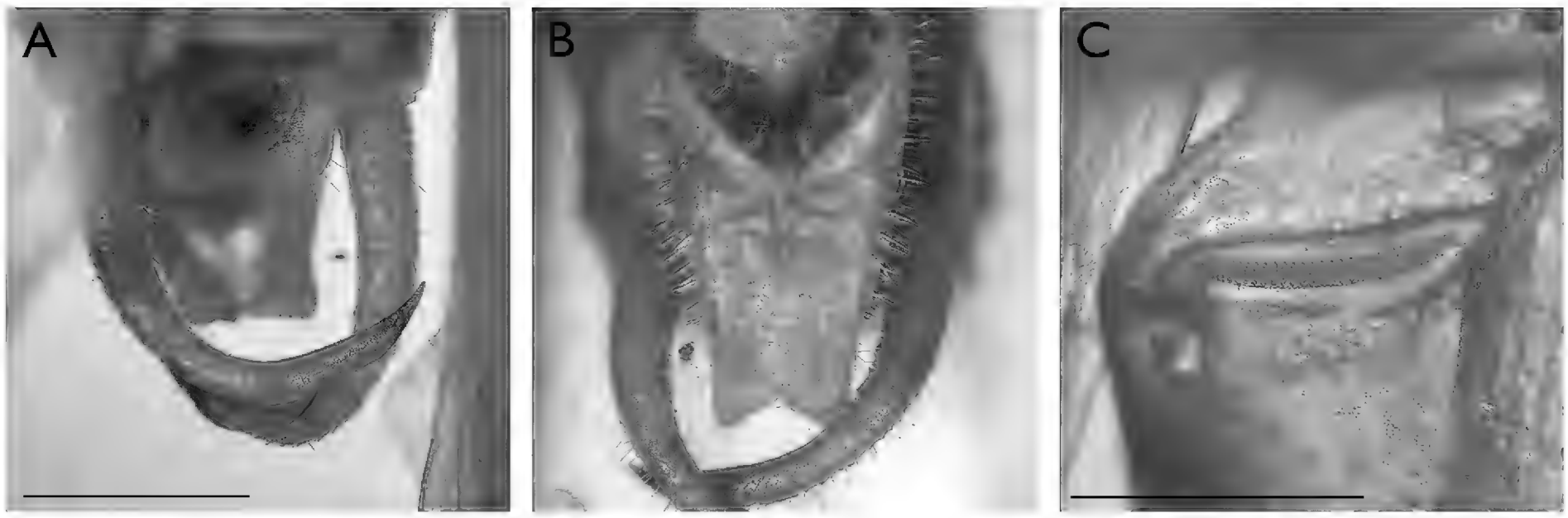

Figure 214. Terminalia and stridulatory file of *Phaneroptera sparsa* Stål, 1857. **A.** Cerci; **B.** Subgentital plate; **C.** Stridulatory file. Qeysoh, Socotra, 28 Feb 2009; SpRF09YE349. Scale bars: 1 mm (photographs Rob Felix).

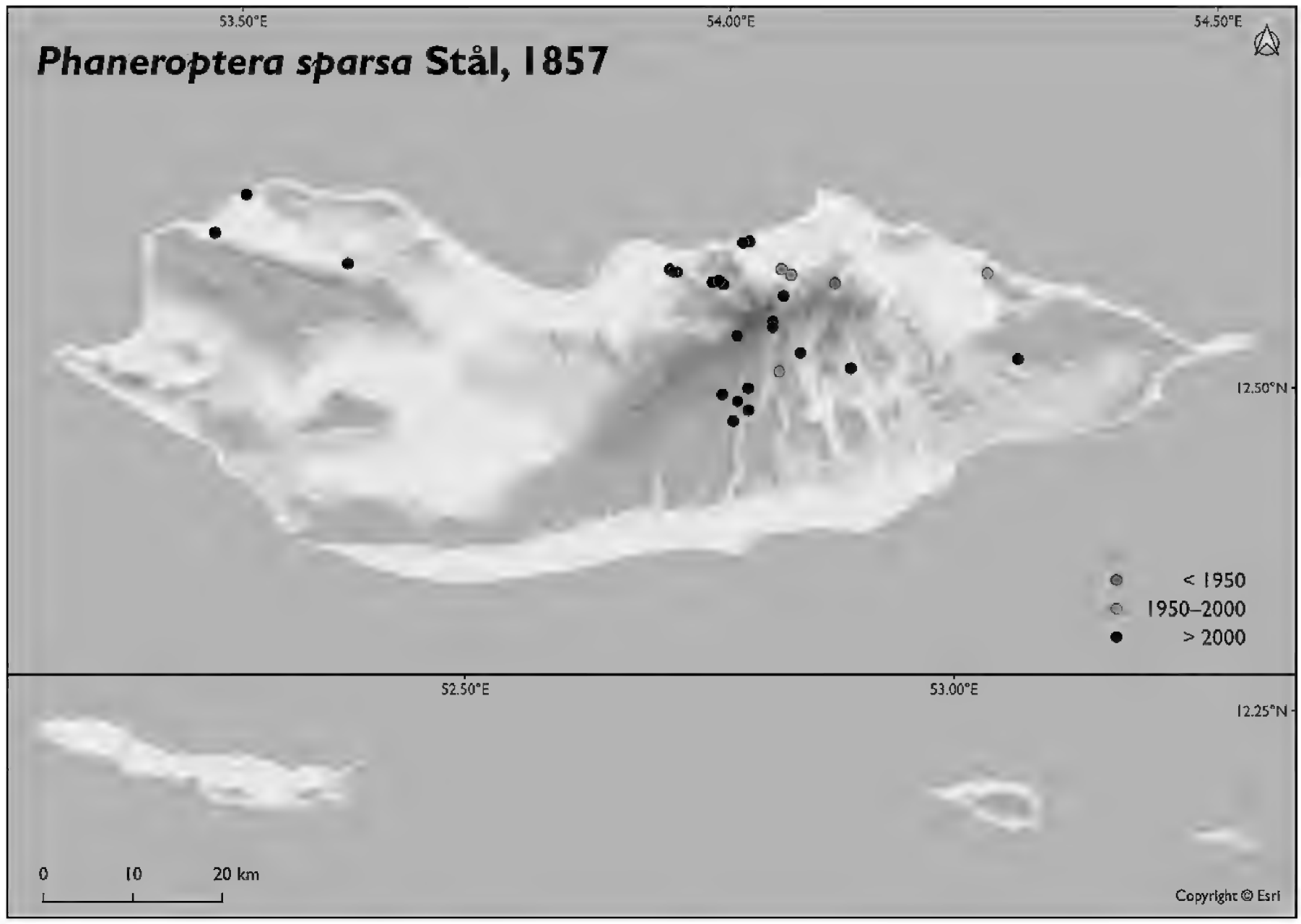

Figure 215. Distribution of *Phaneroptera sparsa* Stål, 1857 in the Socotra Archipelago.

Phaneroptila insularis Uvarov, 1957

Figs 216–218

References for Socotra. Uvarov (in Uvarov and Popov (1957)): 363, figs 6, 7; Ragge 1968: 93; Ragge 1980: 122; Popov 1981: 133; Wranik 2003: 315, plate 148; Massa 2017: 38–39, figs 1–3.

Diagnostic notes. The genus differs from the genus *Phaneroptera* by the shape of the pronotum, the short hind wings (tegmina longer than the hind wings) and the robust cerci (Ragge 1980; Massa 2017). The stridulatory file is more similar to that of *Eulioptera* Ragge, 1956 and *Dannfeltia nana* Sjöstedt, 1902 than *Phaneroptera* in that it is missing the double bending in the distal part of the file, characteristic for the latter genus (B. Massa in litt.).

Taxonomic notes. Uvarov (in Uvarov and Popov (1957)) described the species based on a single male specimen (Fig. 217). The female of *Phaneroptila insularis* Uvarov, 1957 is unknown.

Distribution and occurrence. Endemic to Socotra. Only three records from the well-wooded slopes of the Hagher massif are known (Fig. 218). Due to its arboreal habitat, the species is undoubtedly under-recorded. The two specimens collected in 2014 were found after foliage beating (A. Carapezza in litt.). The coordinates of the 2014 record given by Massa (2017) refer to the entrance of Wadi Ayhaft and are less precise. The coordinates mentioned above are of the estimated collecting site in Wadi Ayhaft (A. Carapezza and B. Massa, in litt.).

Habitat and biology. Based on the collecting sites, the habitat of *P. insularis* is within dense woodland and thick shrubland at a medium elevation in the Hagher (Fig. 11). Uvarov (in Uvarov and Popov (1957)) mentioned dense undergrowth in mixed thickets on the northern slopes of the Hagher. In 2024, a live specimen was observed

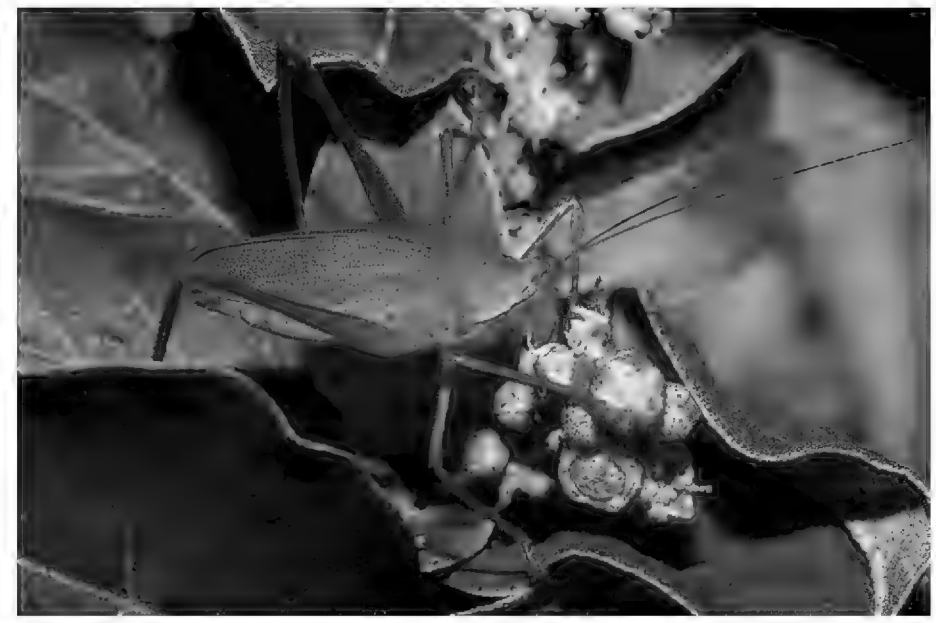

Figure 216. *Phaneroptila insularis* Uvarov, 1957, male, feeding on *Croton sulcifructus*. Adho Dimello, Socotra, 31 Jan 2024 (photograph James Bailey).

feeding on the flowers of *Croton sulcifructus* at around 980 m a.s.l. after sunset (Fig. 216). Records are from 250 to 1000 m a.s.l., from January to March.

Bioacoustics. The song of this species is yet unknown.

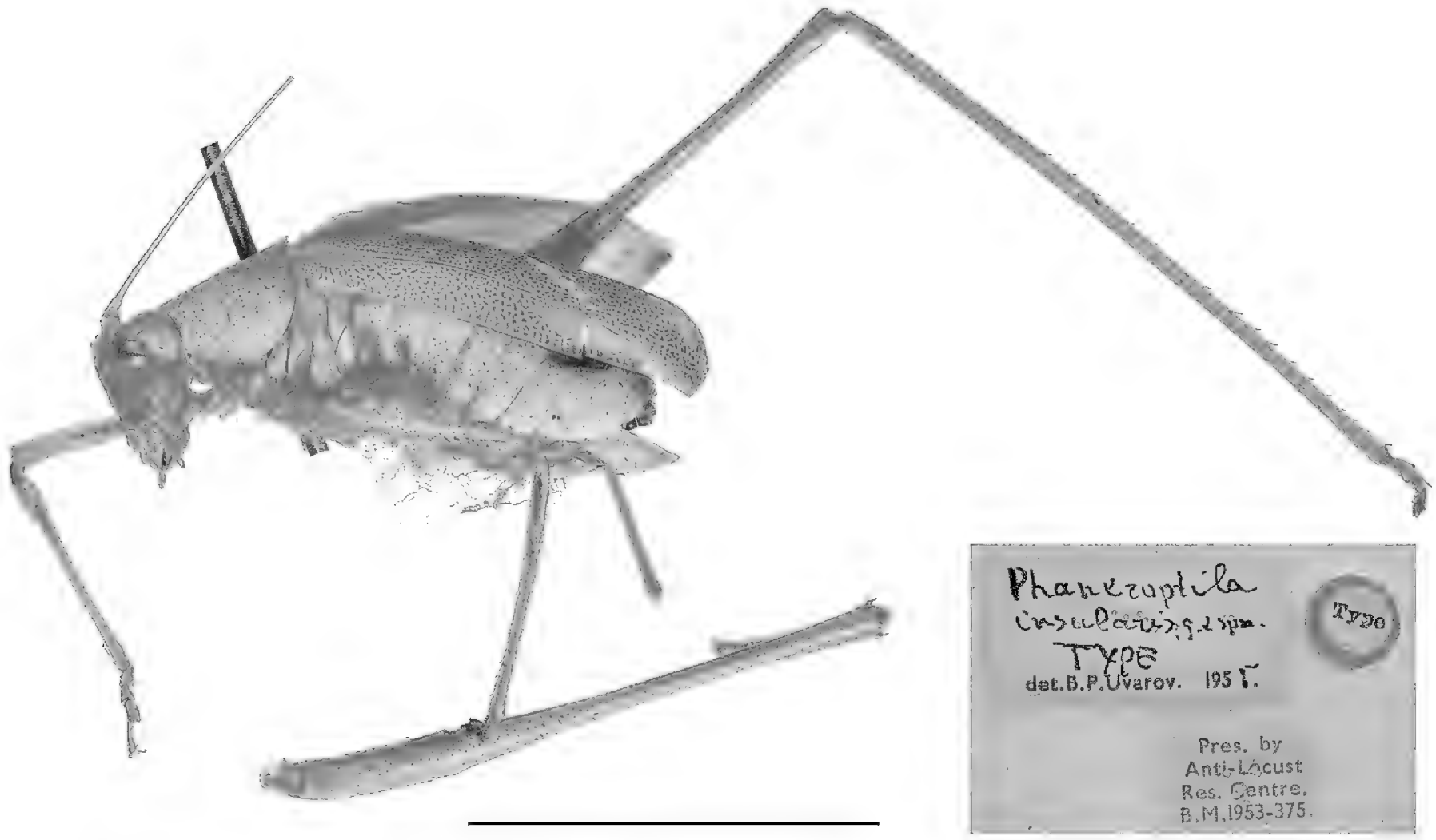

Figure 217. *Phaneroptila insularis* Uvarov, 1957, male, holotype. Hijama, Socotra, collected by George Popov in 1953. Scale bar: 1 cm (photograph Rob Felix).

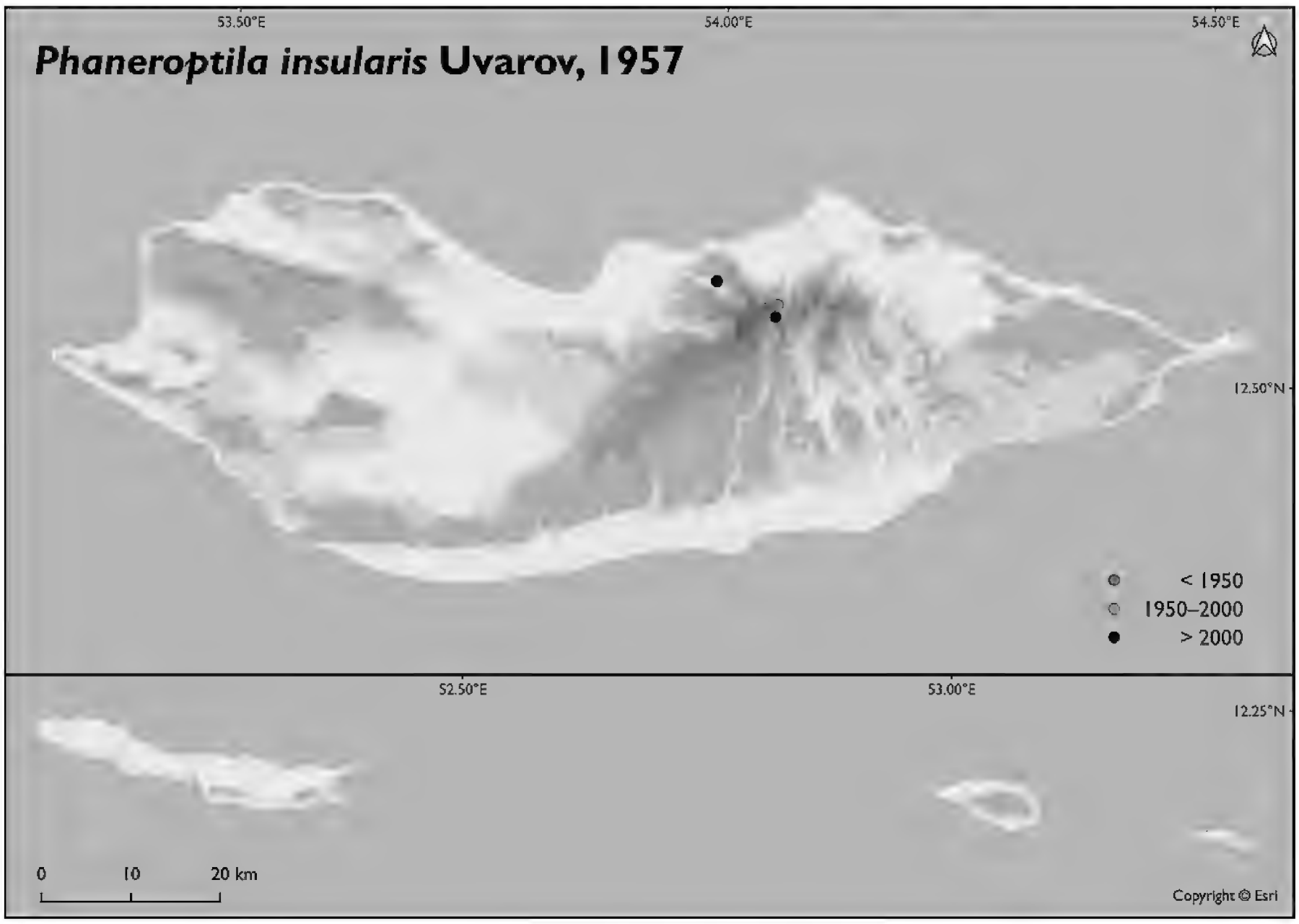

Figure 218. Distribution of *Phaneroptila insularis* Uvarov, 1957 in the Socotra Archipelago.

Results IUCN Red List assessments

Table 9 presents the proposed IUCN Red List threat categories for 29 endemic taxa of Orthoptera in the Socotra Archipelago. *Ectatoderus guichardi* is categorised as Data Deficient (DD) due to taxonomic uncertainty and excluded from the assessments. Excluded, too, is the endemic subspecies *Pyrgomorpha conica kurii*.

Oxytruxalis ensis is classified as Critically Endangered (CR) based on criteria B1ab(ii). With an EOO of 53 km², the geographical distribution of this species is below the threshold of 100 km² for CR and is considered highly fragmented. In addition, *O. ensis* qualifies for CR with an inferred continuing decline in AOO. This species has not been seen since 1967.

Cataloipus brunneri is classified as Endangered (EN) based on B1ab(ii)+B2ab(ii) for its EOO of less than 5000 km² and an AOO of less than 500 km². Its distribution is highly fragmented and its AOO is continuously declining. This species has not been seen since 2008.

Glomeremus capitatus, *Phaneroptila insularis*, *Phaulotypus granti*, *Socotracris kleukersi*, *Socotrella monstrosa* and *Xenephias socotranus*, are classified as VU due to their limited geographical distribution and the threat to their habitats under criterion D2.

Table 9. Proposed IUCN Red List Threat Categories for 29 Socotran endemic Orthoptera species. AOO: Area of Occupancy; EOO: Extent of Occurrence (in km²). See Methods for an explanation of Lower and Upper EOO.

Species	AOO	Lower EOO	Upper EOO	TC
Acheta rufopictus	124	2182	3368	LC
Acorypha bimaculata	176	4523	5570	LC
Acrotylus incarnatus	168	3160	3759	LC
Cataloipus brunneri	28	895	1136	EN
Dioscoridus depressus	60	1036	1211	LC
Ermia variabilis	44	529	933	LC
Glomeremus capitatus	20	38	419	VU
Glomeremus mediopictus	28	618	1303	LC
Glomeremus pileatus	108	2870	3578	LC
Ochrilidia socotrae	12	461	579	LC
Oecanthus castaneus	104	3137	3809	LC
Oecanthus chopardi	20	2236	3182	LC
Oxytruxalis ensis	16	53		CR
Pachysmopoda abbreviata	96	1522	1823	LC
Phaneroptila insularis	12	5	52	VU
Phaulotypus dioscoridus	32	230	480	LC
Phaulotypus granti	12	2	80	VU
Phaulotypus insularis	100	1771	2005	LC
Phaulotypus socotranus	36	231	467	LC
Physemophorus sokotranus	104	1697	1855	LC
Scintharista forbesii	164	2569	3584	LC
Socotracris kleukersi	4	0	0.03	VU
Socotrella monstrosa	8	0	179	VU
Sphingonotus albipennis	8	0	15	LC
Sphingonotus ganglbaueri	100	4799	5892	LC
Sphingonotus insularis	148	4644	6012	LC
Stenohippus socotranus	160	2075	3028	LC
Truxalis viridifasciata	48	1481	2749	LC
Xenephias socotranus	12	1	95	VU

Discussion and conclusions

Species richness

Since the last publications on Socotran Orthoptera by Wranik (2003) and Massa (2009, 2017), eight species have been added to the faunal list of the Archipelago, bringing the total to 64 resident and one non-resident introduced species.

Two new species have been described, based on material collected during our surveys in 2009 and 2010: *Oecanthus castaneus* sp. nov and *Socotracris kleukersi*. The occurrence of *Acrotylus innotatus*, *Dictyophorus griseus*, *Eumodicogryllus chivensis*, *Ochrilidia* cf. *O. geniculata*, *Sphingonotus rubescens* and *S. balteatus* and two yet unknown wingless crickets assigned to *Ectatoderus* in the Archipelago is documented for the first time.

On Socotra, the main island, 59 resident species occur, of which at least 29 are endemic to the Archipelago. Of the endemics, only *Acorypha bimaculata*, *Sphingonotus ganglbaueri* and *S. insularis* (and possibly *Oecanthus chopardi*) occur outside the main island, on Samha, with seven known species. From Abd el Kuri, six species are known, including the endemic *Sphingonotus albipennis* and the endemic ssp. *Pyrgomorpha conica kurii*. From the species occurring on Abd el Kuri, only *Scintharista notabilis* has been recorded on the main island (one specimen). On Darsa, only two species are recorded. Abd el Kuri, Samha and Darsa are still poorly studied.

Outside the Archipelago, the 31 non-endemic taxa mostly have an Afrotropical distribution (27), 21 of which also occur in the Palearctic and 11 in the Indo-Malayan realm. Two species are confined to the Palearctic (*Acrotylus innotatus* and *Eumodicogryllus chivensis*). Two species have a circumpolar distribution (*Acheta domesticus* and *Gryllodes sigillatus*).

Dictyophorus griseus is considered a non-resident introduced species. There has only been one record of this non-flying species in the capital.

With nine endemic genera, 30 endemic species and one endemic subspecies, the Socotra Archipelago has a high level of endemism in Orthoptera, especially on the genus level. Identifying the yet unidentified species of *Ectatoderus* and *Mogoplistes* and further study on *Ruspolia*, *Gryllotalpa* and *Sphingonotus* will probably increase the number of endemics.

As a comparison, 69 resident species occur in the Seychelles, of which 37 are endemic (Gerlach and Haas 2008). In the Mascarene Islands (Mauritius, Réunion and Rodrigues), 116 species occur, 81 endemics and seven endemic genera (Hugel in litt. 2016). Both island groups have a tropical and subtropical climate with lush, dense, tropical vegetation. Most of the Socotra Archipelago

however, has a hot, arid and semi-desert climate; only a limited area is well-vegetated.

The highest species diversity on the Archipelago's main island is observed in the Hagher Mountains and the highest parts of Dixam Plateau. All but one of the 29 main island endemics occur here. Records of *Glomeremus capitatus*, *Phaneroptila insularis*, *Socotrella monstrosa*, *Oxytruxalis ensis*, *Phaulotypus granti* and *Xenephias socotranus* are confined to this limited area. Generally, higher species numbers are found at higher elevations. Accordingly, high species numbers were also recorded in the west on the Ma'alah and Shibereh plateaus and in the Hamadera hills in the east. These are the only sites where *Ermia variabilis* and *Oecanthis chopardi* occur outside the Hagher.

IUCN Red List

Currently, only a limited number of Red List assessments exist for the insect species of Socotra, with just 23 species assessed, primarily dragonflies (IUCN 2024). This study extends this number by assessing 29 endemic Orthoptera species, though these findings remain provisional until reviewed by IUCN.

One-third (28%) of the assessed Socotran endemics is endangered. In comparison, approximately 28% of the species evaluated worldwide are threatened (IUCN 2024).

Amongst the species evaluated, *Cataloipus brunneri* and *Oxytruxalis ensis* are notable due to their prolonged absences. *C. brunneri* has not been observed since 2008, despite searches in 2009, 2010 and subsequent expeditions and field trips. *O. ensis*, with only four known specimens, has not been found since 1967.

Threats and protection

The human impact on ecosystems through agriculture and natural resource use on Socotra is omnipresent and may also include climate change-induced hazards such as storms and droughts (Van Damme and Banfield 2011; Brown and Mies 2012). Approximately 80% of the land area on Socotra is used for livestock grazing (Brown and Mies 2012). Although the Archipelago was declared a Biosphere Reserve in 2003 and a World Natural Heritage site in 2008, its natural habitats are far from secure.

Many of the animals kept are goats, significantly impacting the vegetation in the low to middle altitudes due to their large numbers and husbandry practices. Grazing is responsible for deteriorating habitat quality and alters plant communities by allowing inedible plants to proliferate without competition, changing native plant communities (Scholte et al. 2008; Van Damme and Banfield 2011). Grazing on Socotra has existed for a long time. Wellsted (1835) already gave the following insight: "*The only animals we saw were camels, sheep, asses, oxen, goats and civet cats. There are numerous cows near Tamarida and in the mountains in its vicinity. The pasturage for them is abundant. Vast flocks of sheep and goats are found in every part of the island, the latter so numerous that the owners keep no account of them*".

There is no doubt that there have been a lot of changes in the Socotra landscape over the last centuries. Hadiboh Plain was described by Forbes (1903): "The roughness of the ground was concealed in general view by a thick low shrub, consisting chiefly of *Dirichletia*, *Euphorbia*, *Jatropha unicostata*, and conspicuous among the others from their bizarre habit, *Adenium* and the remarkable Cucumber-tree, *Dendrosicyos*". Hadiboh Plain currently, at best, is a highly degraded *Croton* vegetation on largely bare ground. These changes have had a significant impact on the biodiversity that is dependent on habitats rich in herbs and grasses. Since members of the Truxalini are typical species of grassy vegetation, the vanishing of *Oxytruxalis ensis* probably has been caused by overgrazing. The grass-loving *Ochrilidia gracilis nyuki* occurred on Hadiboh plain, but disappeared from the island in the 60s and 70s. There have been no records since 2008 from the endemic *Cataloipus brunneri*, also a species of (moist) grassy habitats.

Grazing also occurs in higher elevations, but not to the same extent as in lower areas, as the livestock-holding population tends to reside in population centres such as Hadiboh and Qalansiyah, which are situated at lower altitudes (Brown and Mies 2012). Other forms of agriculture, such as date palm cultivation, also occur only near the population centres, as they require constant irrigation (Brown and Mies 2012).

Wood is used on Socotra as building material and fuel. The use of natural resources, which occurs on land in Socotra in the form of deforestation, has devastating effects on vegetation, as deforestation has increased not only for personal use as in the past, but also for commercial purposes due to infrastructure development in recent years (Van Damme and Banfield 2011).

Although water drainage from wadis more greatly threatens freshwater animals like dragonflies (Van Damme et al. 2020), it can also threaten grasshoppers that occupy adjacent wetlands like *Cataloipus brunneri*, *Modicogryllus perplexus* and *Gryllotalpa* aff. *G. africana*.

In the Red List assessment, the lack of data on population sizes was a recurring problem. As there is no detailed information regarding the abundance of the threatened species, it is difficult to assess how threatened the grasshopper populations of the Socotra Archipelago are. It is assumed that extreme weather events will intensify and increase in number. Thus, a deterioration of the areas of endangered species can also be expected in the near future. Therefore, the urgency for research on the populations and lifestyles of grasshoppers becomes clear.

There are no specific conservation measures for the endangered grasshoppers. The Hagher Mountains and surrounding plateaus are essential sites for the investigated grasshopper species. With the highest concentration of grasshopper species, it harbours endangered species and the most non-endangered grasshopper species. Therefore,

the area should be given the highest priority in planning specific conservation measures for grasshoppers on Socotra, especially in the face of increasing climate change and an insect decline of unknown extent.

Survey coverage

Life history data for Orthoptera species on Socotra have been insufficiently documented, although records of adults and nymphs are mentioned separately to provide insights into each species' seasonal activity patterns. During the southwest monsoon (May–September), few visits by entomologists took place due to harsh weather conditions. As a result, the life cycles of the various species are largely unknown, including whether they are univoltine or multivoltine and whether they exhibit continuous breeding.

Analysis of labels and site names

We have invested some effort in analysing the collection site information provided on labels in museum collections and literature. This analysis revealed that many of these records are often less accurate than expected. Below, we summarize examples illustrating these inconsistencies.

In the case of material collected by G. Popov in 1953, but described by Uvarov (in Uvarov and Popov (1957)), there are some discrepancies between elevation data mentioned on the labels and data mentioned in the original species description (see *Oecanthus chopardi* and *Glomeremus mediopictus*). In these cases, the data mentioned on the label and later in Popov (1984) are used since Popov collected the specimens, not Uvarov. Data on the label also better fit the presumed habitat requirements. On the other hand, coordinates mentioned some thirteen years later by Popov (1997) proved wrong.

In general, elevation data on the labels are very imprecise. For instance, several labels list Homhil as 2500 ft (762 m a.s.l.), but aside from a barren peak, there is nowhere in the Homhil area that reaches that height. Most of Homhil is closer to 300–400 m a.s.l. Another example is Shihali, which is labelled as 1500 m a.s.l., though the collecting event likely did not occur above 1100 m a.s.l.

The dates on labels from Guichard are often inaccurate compared to his field notes (in Guichard (1967)).

Many specimens in the NHMUK bear the expedition label "Sokotra. 1900-234". It has led to some confusion since specimens were not collected in 1900 and not all of them on Socotra, but also on Abd el Kuri – see page 376 in Uvarov and Popov (1957) and pages 66–67 in Hsiung and Kevan (1975).

Finally, it was unclear where the site Hijama is situated, which is mentioned as the collecting site of several specimens by Uvarov and Popov (1957). We consider it to be the same site that is known as Kishin and consider the following locations to be situated all more or less on the same site (12.5852°N, 54.0507°E): on the northern slope of the Hagher, in the ascent to Adho Dimello through Wadi Dineghen, at an elevation of around 700 m a.s.l. (Hijama, 2500 feet (= 760 m a.s.l.), 15 Mar 1953, Popov; Kishin, 2089 feet (= 635 m a.s.l.), several dates Aug 1956, Oxford expedition; Kishin, 700 m a.s.l., 18 Apr 1967, Guichard). It is a known campsite (see fig. 1 in Uvarov and Popov 1957) and the same site where the 2010 expedition halted for lunch (Fig. 11).

Future study

One of the conclusions we can draw from this study is that there is much that Orthopterists can still discover in the Socotra Archipelago. Numerous species have eluded rediscovery for several decades. *Ochrilidia gracilis nyuki* has only been found once in 1967 by Kenneth Guichard. He also found the second and last specimen of *Oxytruxalis ensis*. It would be worthwhile to search for places with grassy vegetation where overgrazing has not been too harmful to investigate the present status of these species in the Archipelago. There have been no sightings since the last record of *Cataloipus brunneri* in 2008. The species' present status on the island has to be determined.

The actual rarity of several species must be determined. In this respect, we want to mention *Ochrilidia socotrae*, *Glomeremus capitatus* and *Phaneroptila insularis*. *Ochrilidia socotrae* is only known from three localities and is highly associated with *Urochondra setulosa*. According to Brown and Mies (2012), this plant species occurs on various sites along the coast. Visiting these sites and checking the species' presence is recommended. Determining the status of *Glomeremus capitatus* can be done by future night visits to Dixam and the Hagher. Future studies should focus on collecting data on *Phaneroptila insularis*, a virtually unknown species of which neither the female nor the song have been recorded. We recommend light trapping and foliage beating on the well-vegetated northern slopes of the Hagher and in Wadi Ayhaft, as well as collecting (ultra)sound recordings at night.

Taking a broader perspective, we highlight the emphasis on directing future field studies towards Gryllidea (encompassing crickets, mole crickets and related species) in combination with the study of bioacoustics.

The present paper is the first study focusing on the bioacoustics of the Orthoptera of Socotra. More studies are welcome. Nightly field studies could yield exciting results, especially in high montane habitats and near the entrances of caves. Future visits to the islands should focus on collecting several series of adult specimens of *Gryllotalpa* and Mogoplistidae from different localities, accompanied by sound recordings. Recordings of the calling song of *Oecanthus chopardi*, *Phaneroptila* and *Socotracris* are most welcome.

Genetic analysis of the three *Glomeremus* species is interesting since *G. mediopictus* could merit its own genus. Moreover, since the type material of *G. pileatus* is lost, the designation of a neotype is recommended. The relationships between *Modicogryllus perplexus* from the type locality in South Africa and the Arabian and Socotran

taxon must be sorted out. Finally, the genus *Ruspolia* requires a phylogenetic study based on genetics, morphology and bioacoustics. The specific status of the species occurring in the Socotra mountains must be determined.

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Competing interests

The authors have declared that no competing interests exist.

Author contributions

Rob Felix: Conceptualisation, Investigation, Resources, Data Curation, Writing – original draft (all chapters), Visualisation, Funding acquisition; **Jaap Bouwman:** Investigation, Resources, Writing – original draft (Discussion), Writing – review and editing, Funding acquisition; **Baudewijn Odé:** Formal analysis (Bioacoustics), Writing – original draft (Bioacoustics); Writing – review and editing; **Robert Ketelaar:** Investigation, Resources, Visualization, Writing – original draft (Climate, Geology and Habitats); Writing – review & editing, Funding acquisition; **Duc Minh Pham:** Formal analysis (Red List); Writing – original draft (Red List); **James Bailey:** Investigation, Visualisation, Writing – review and editing. All authors have read and agreed to the published version of the manuscript.

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Supplementary material 1

Material examined

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Supplementary material 2

Field observations

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